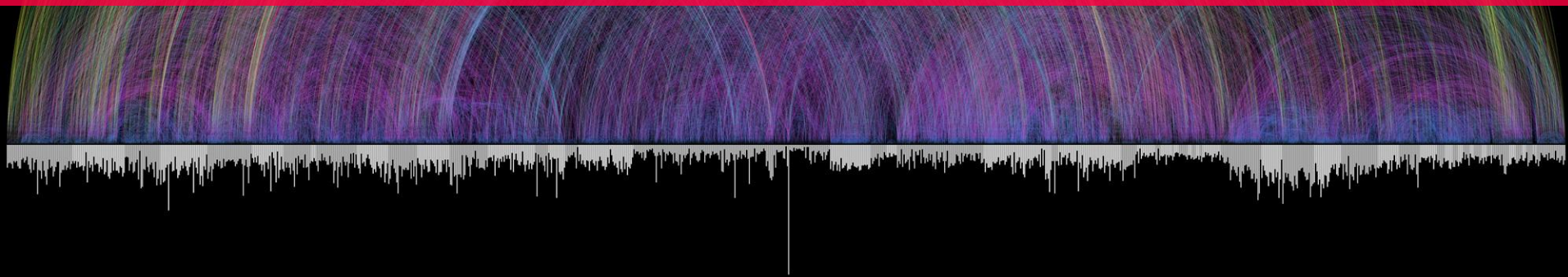


DATA VISUALIZATION





Hello!

I am Luz Calvo

UX Researcher

Visualization department

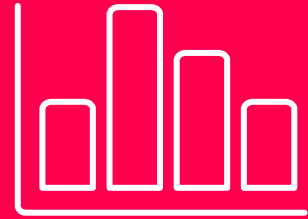
BSC – CASE

luz.calvo@bsc.es

UX



497253471



1. Basic Concepts

Why and what?

Main fields of Visualization



Data Visualization

What is Data Visualization for you?

Data Visualization

“
Mapping values to visuals...

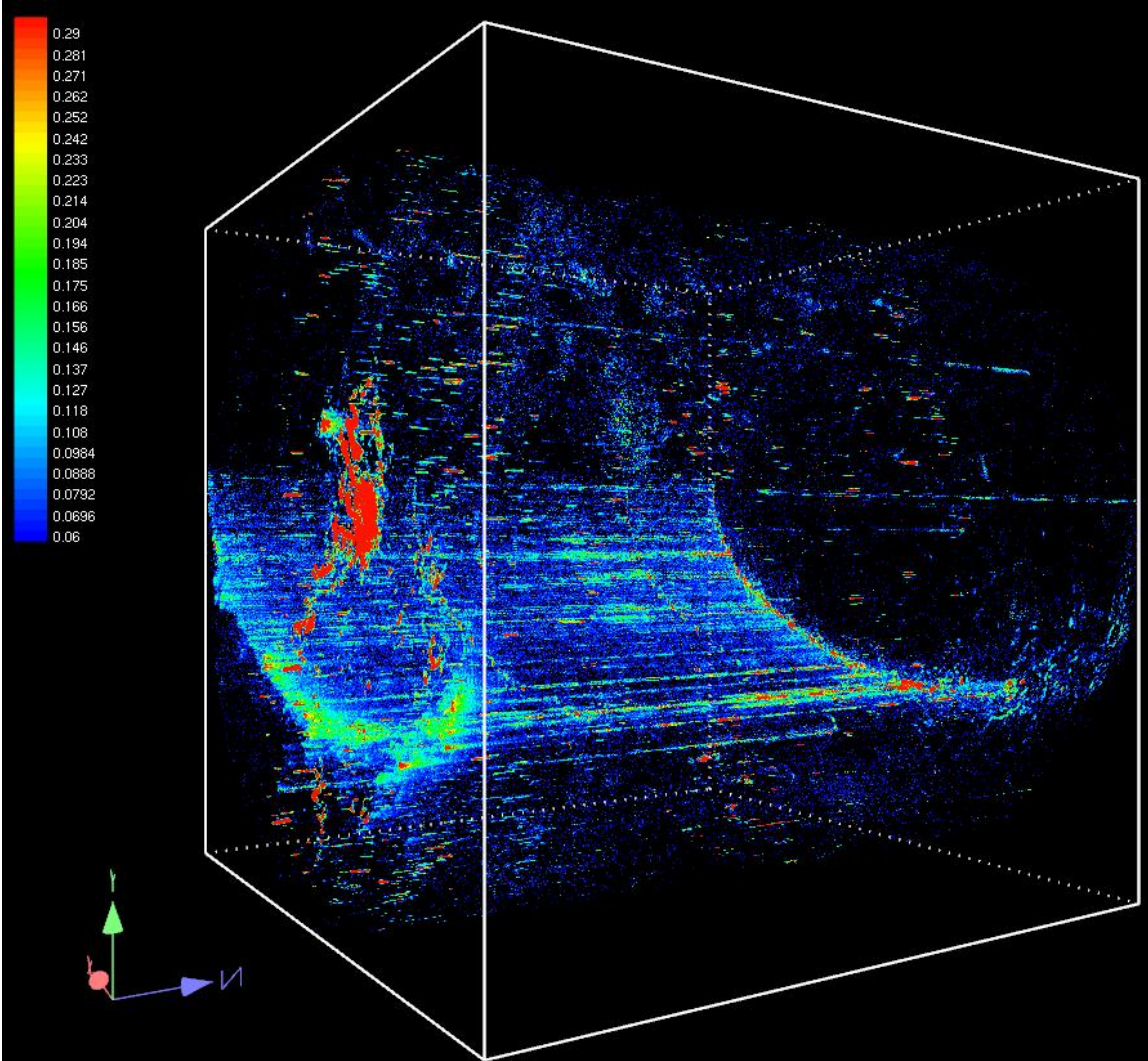
“
*Turning numbers into pictures and
into stories...*

“
An A-ha moment of understanding...

Scientific Visualization

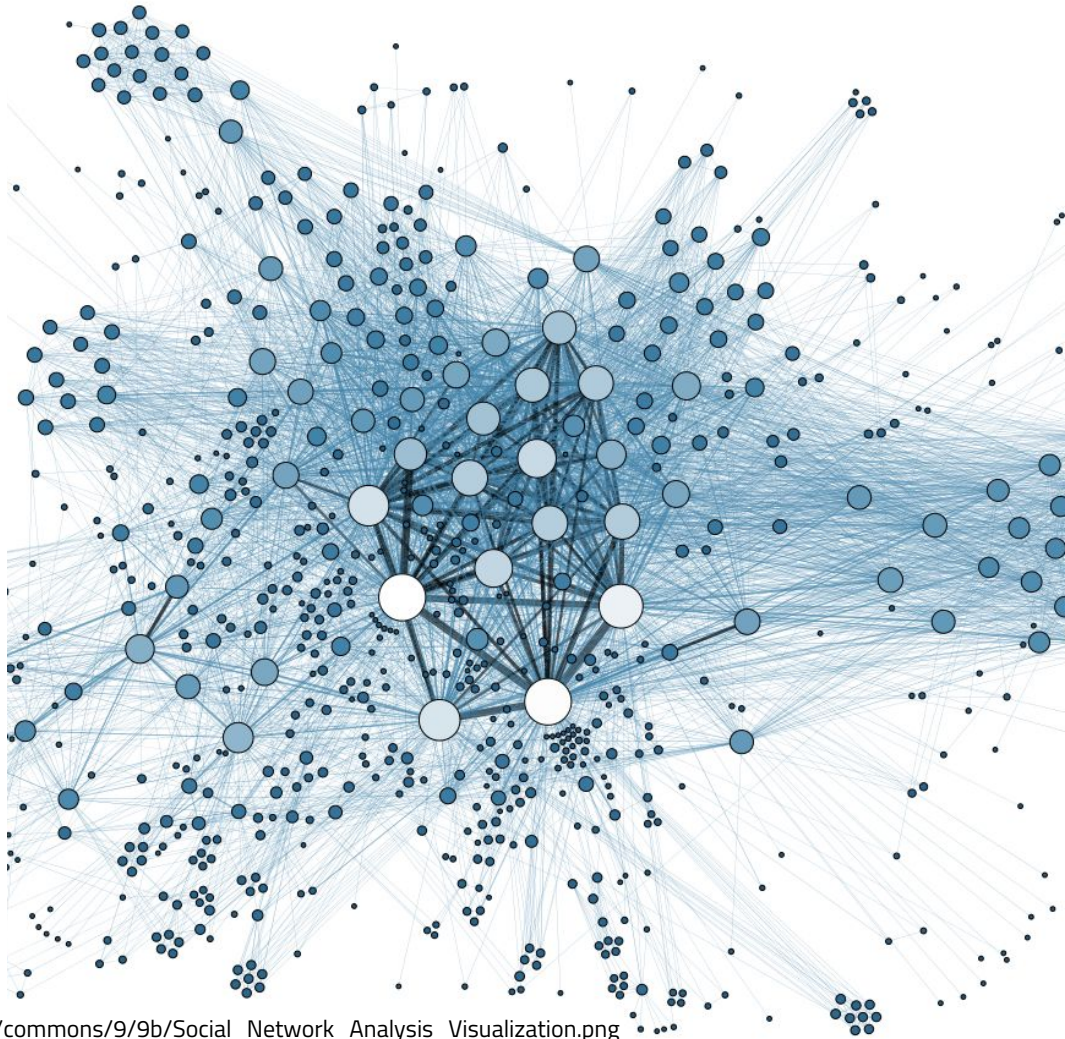
The purpose of scientific visualization is to graphically illustrate scientific data to enable scientists to understand, illustrate, and glean insight from their data.

<http://www.atnf.csiro.au/research/WALLABY/images/HIPASS-3D-Cube.jpg>



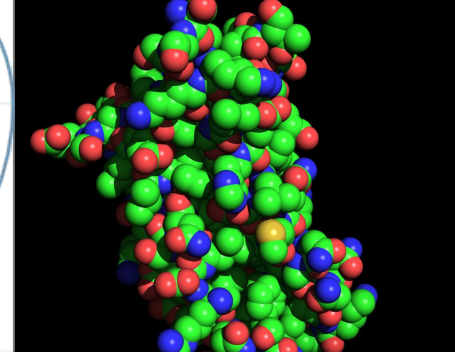
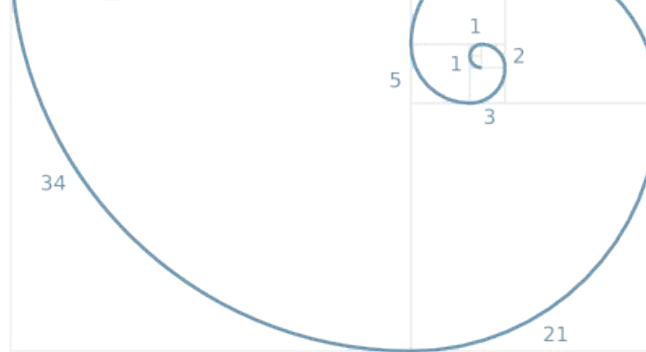
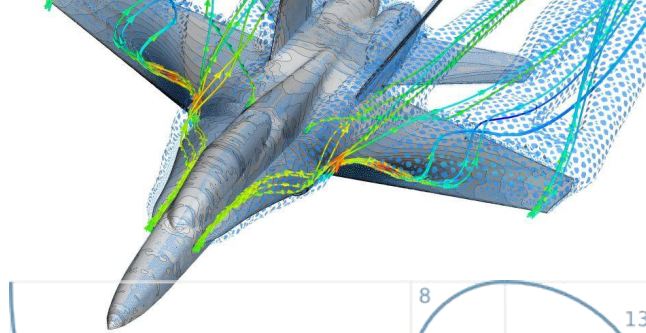
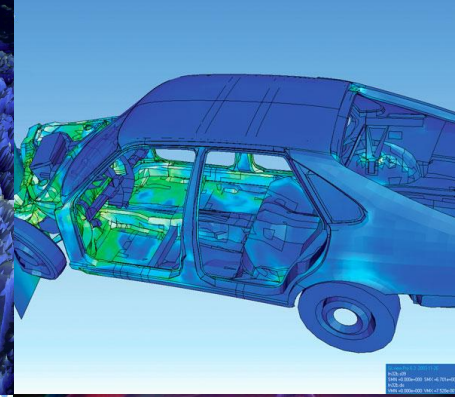
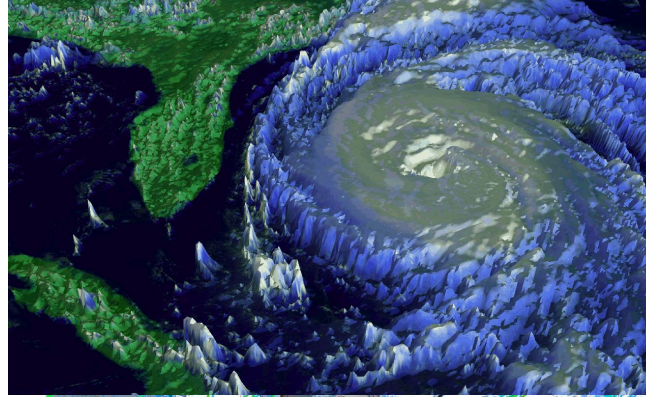
Information Visualization

Is the study of (interactive) visual representations of abstract data to reinforce human cognition.



Some domain specific Visualization Applications

- Medical Imaging
- Maths
- Business Intelligence
- Educational Visualization
- Geographical
- Information Systems



Lots of Information

Less time to consume

TOP 50 MAPA DE PODER INFLUYENTES EN LA RED PERÚ, 2014

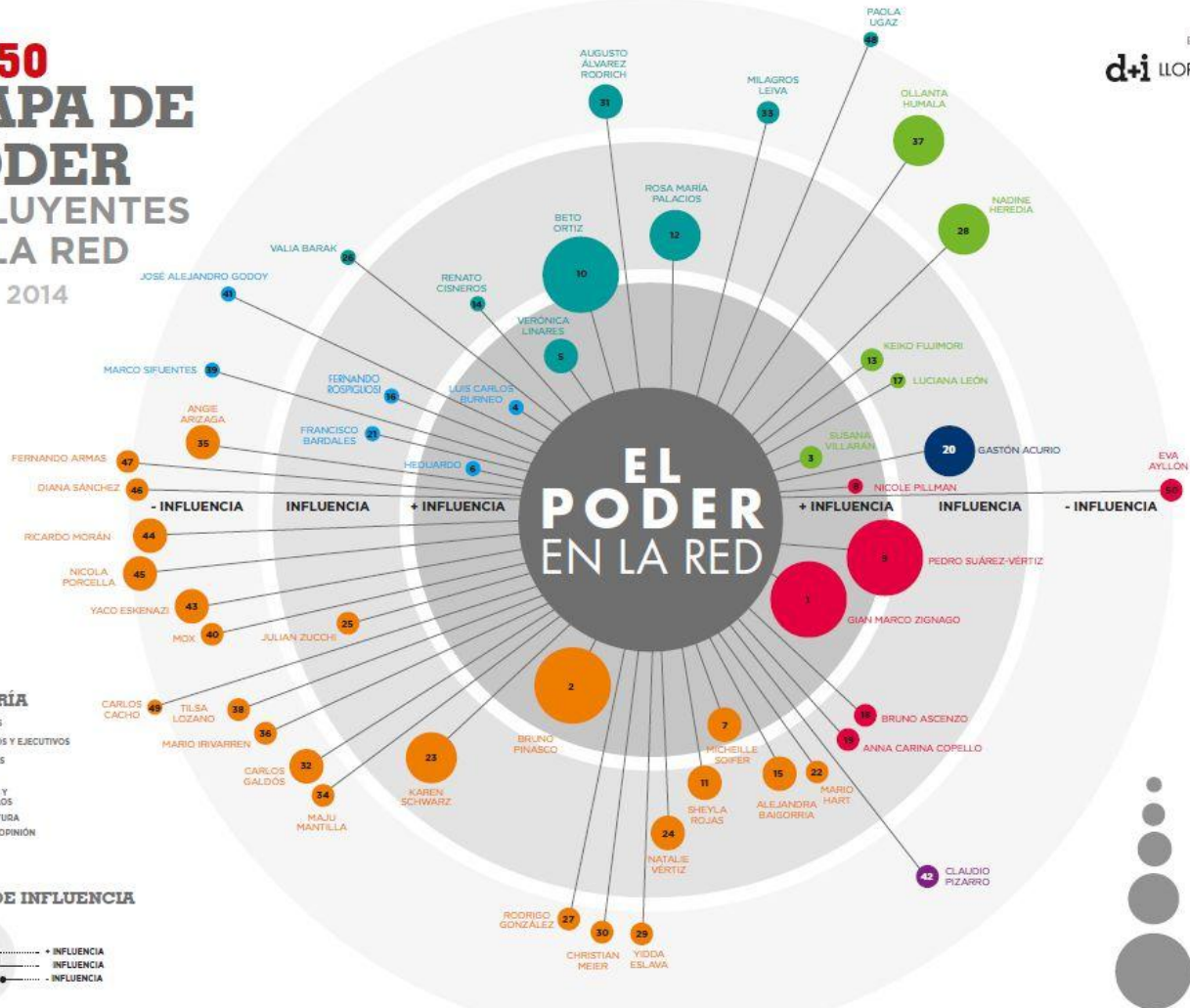
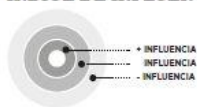
Elaborado por
d+i LLORENTE & CUENCA



CATEGORÍA

- PERIODISTAS
- EMPRESARIOS Y EJECUTIVOS
- DEPORTISTAS
- POLÍTICOS
- FAMANDULA Y ESPECTACULOS
- ARTE Y CULTURA
- LÍDERES DE OPINIÓN

ÍNDICE DE INFLUENCIA



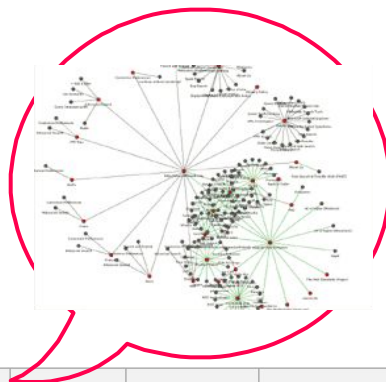
PUESTO
TOP 50

SEGUIDORES

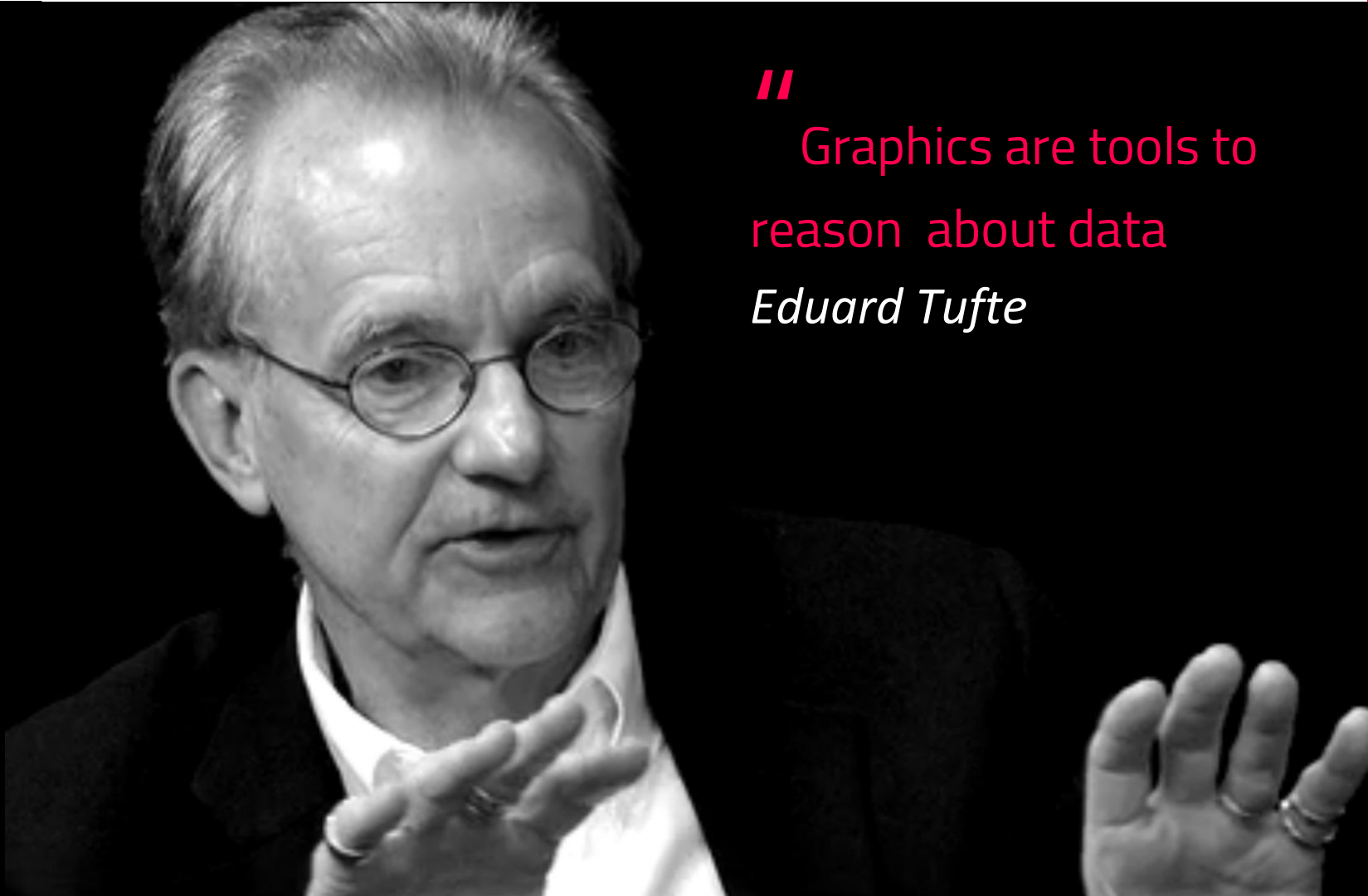
- 0 A 200,000
- 200,000 A 449,000
- 450,000 A 749,000
- 750,000 A 999,999
- + DE 1 MILLÓN

The way we show information

Lists vs. graphics



Wiki software ⇅	Creator ⇅	First public release date ⇅	Latest stable release ⇅	Stable release date ⇅	Predecessor ⇅	Software license ^[1] ⇅	Open source ⇅	Encoding ⇅	Multilingual ⇅	Programming language ⇅	Data backend ⇅
BlueSpice for MediaWiki	Hallo Welt! - Medienwerkstatt GmbH	31 March 2011	2.23.2	30 November 2015 ^[2]	MediaWiki	GPL v2	Yes	UTF-8	Yes	PHP	MySQL
BrainKeeper	BrainKeeper, Inc.	1 September 2005		1 March 2010		Proprietary	No		Yes	Java/Java EE	MySQL
Central Desktop	Central Desktop Inc.	1 October 2005	2.0	22 February 2010		Proprietary	No			PHP	PostgreSQL
Confluence	Atlassian	25 March 2004	5.9.4	8 January 2016 ^[3]		Proprietary	No ^[4]	UTF-8	Yes	Java, Java EE	DB2, MS SQL Server, MySQL, Oracle, or PostgreSQL
ConnectedText	Eduardo Mauro	2005	6.0.12	21 February 2015		Proprietary	No		Yes	C++	SQL
DokuWiki	Andreas Gohr	July 2004	2015-08-10 "Detritus" ^[5]	10 August 2015		GPL v2	Yes	UTF-8	Yes	PHP	File system
EditMe	Matt Winkler	August				Proprietary	No	ISO8859-1	No	Java	MySQL



//

Graphics are tools to
reason about data

Edward Tufte

Exploratory Analysis vs. Explanatory Analysis

Exploratory

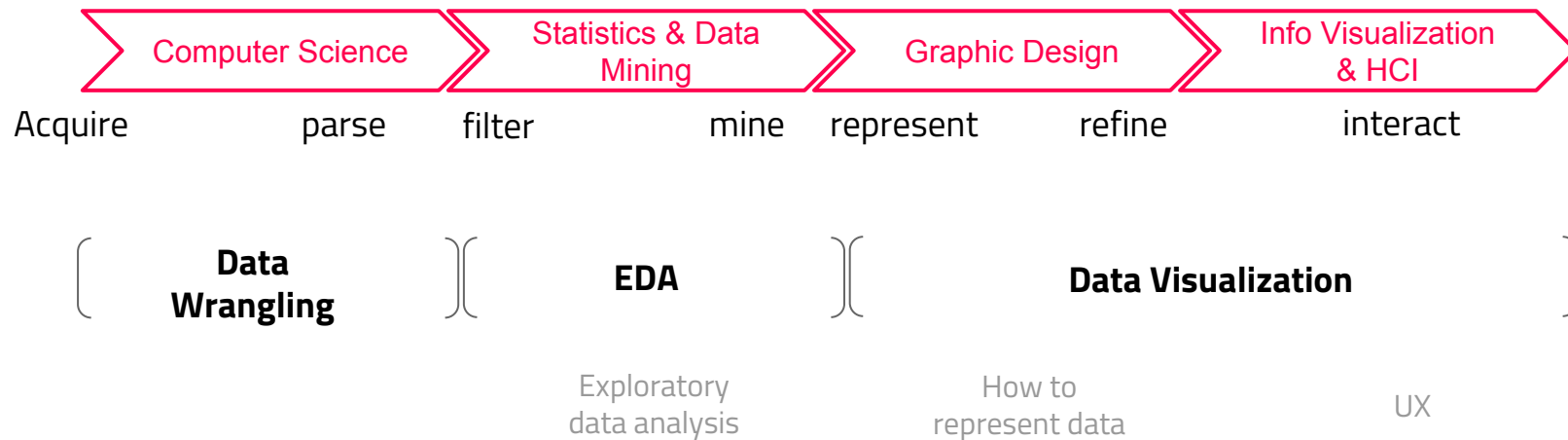
1. What might be interesting about it?

Explanatory

2. Explain it to somebody specific

The data science process

Steps



Exploratory Analysis vs. Explanatory Analysis

Exploratory

Tableau
Datawrapper
Excel
CartoDB
Google Charts

Explanatory

D3.js
Three.js
WebGL

Modes of Visualization

Interactive Visualization

Used for discovery

Single investigator or collaborator

User input

Presentation Visualization

Used for communication

Large group – mass audience

Does not support User input

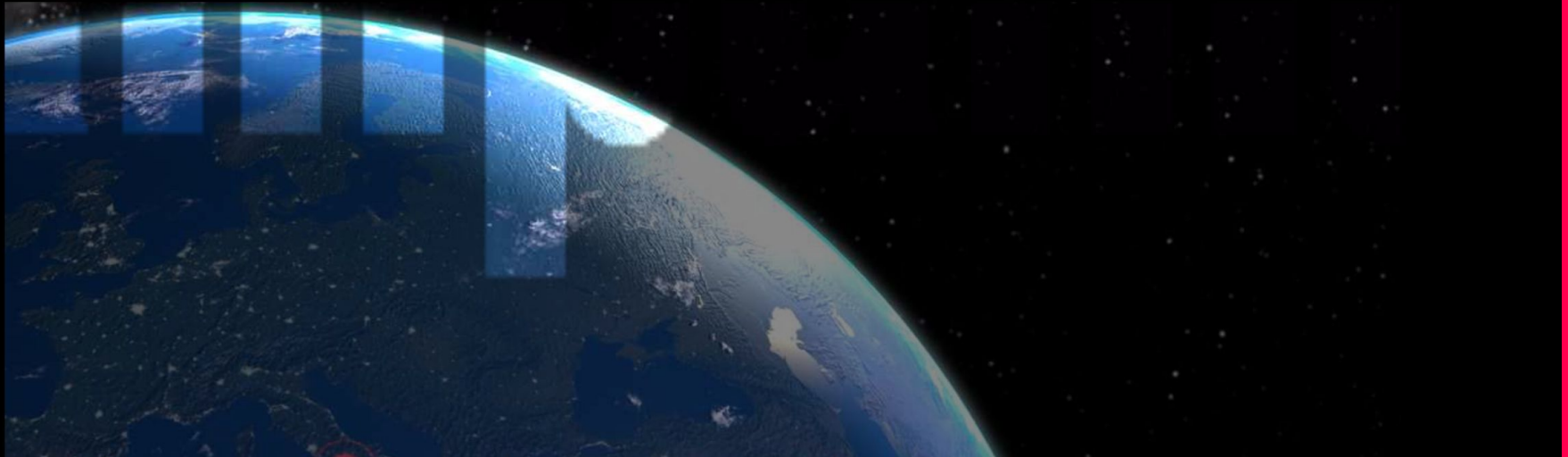


Interactive Storytelling

Presentations via interactive

Interactive Storytelling

http://www.bsc.es/viz/campanian_ignimbrite/



Eruption Dynamics: a two-phase Event

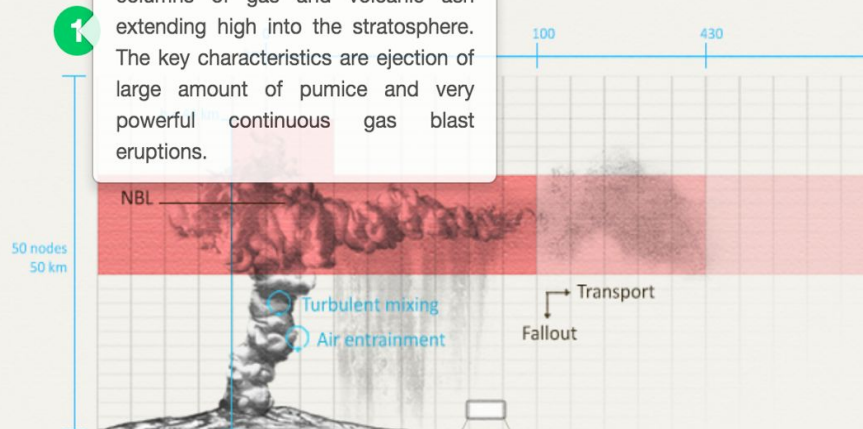
Geological evidence indicates that the eruption had two phases and possibly had the following sequence:

- 1) a short, high-intensity Plinian explosive phase injecting gas and volcanic ash high into the stratosphere,
- 2) density-current transport affecting tephra dispersal and deposition near the source,
- 3) a caldera collapse, producing large and fast flows of hot gas and rocks (pyroclastic flow) that scaled mountain ridges of more than 1 km in height,
- 4) a significant portion of fine-grained material was lofted from the top of the propagating currents as co-ignimbrite plumes,
- 5) the finer ash of the co-ignimbrite phase dispersed downwind up to thousands of kilometres away from the eruption site.

Density current

Plinian

Plinian eruptions are marked by columns of gas and volcanic ash extending high into the stratosphere. The key characteristics are ejection of large amount of pumice and very powerful continuous gas blast eruptions.



Transport type

- Density-driven
- Mixed
- Passive





2.

About human perception & attention

Rules of Perception

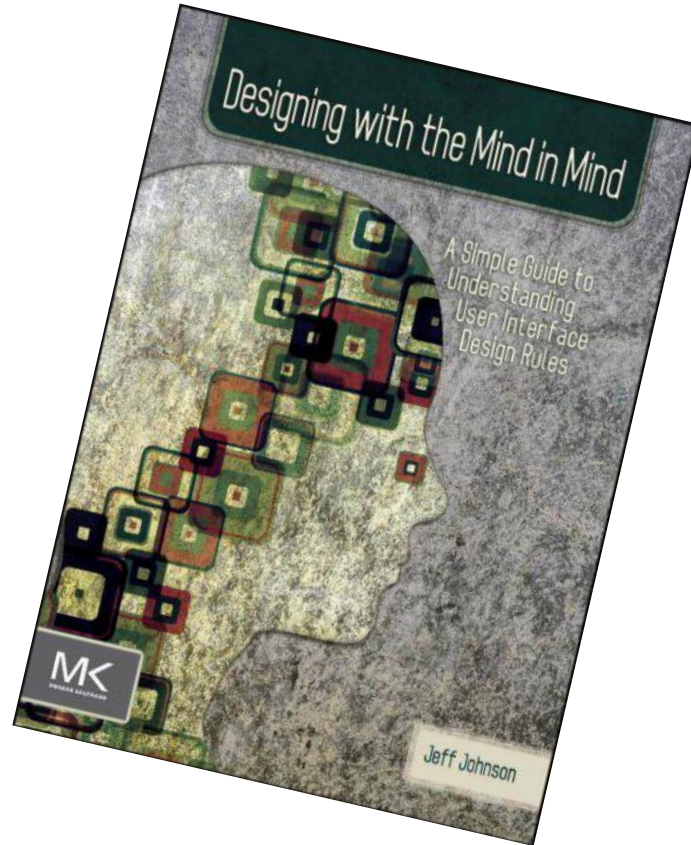
Gestalt Principles

- Proximity
- Similarity
- Closure
- Continuity
- Figure/Group

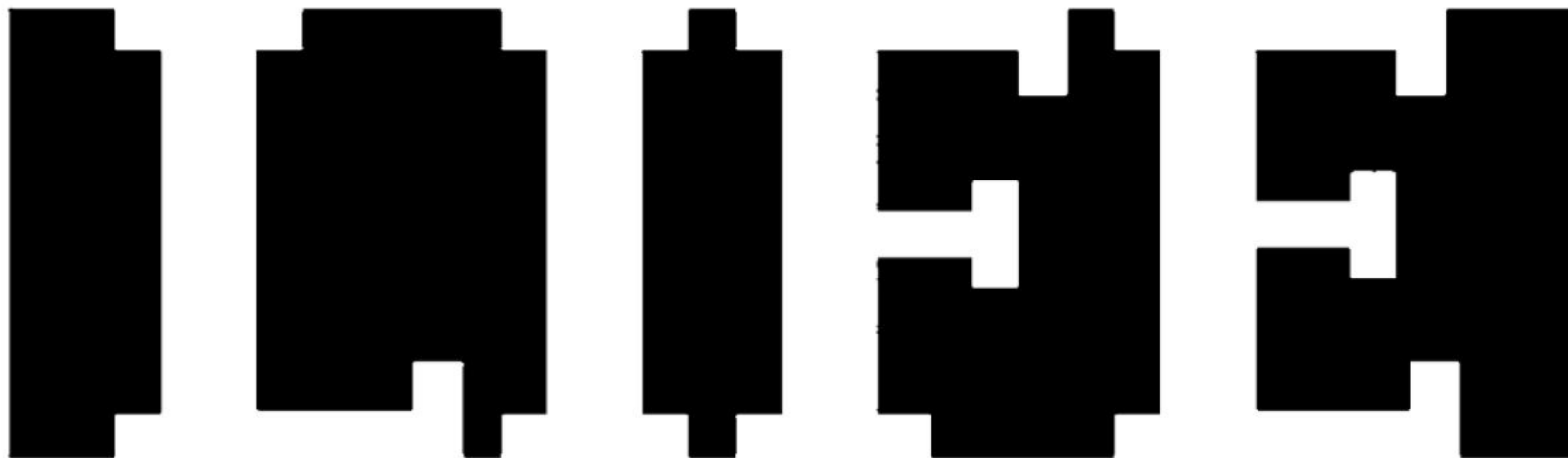
You audience will listen to you or read the content, but won't do both.

Designing with the mind in mind

Jeff Johnson



We perceive what we expect
perception biased by experience



Building map or word?

**We perceive what
we expect**
**perception biased
by experience**



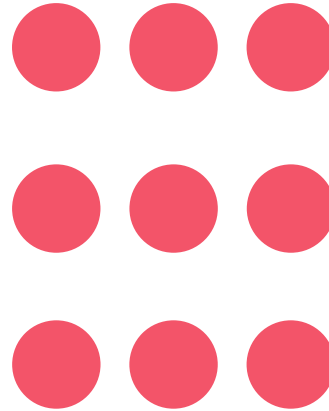
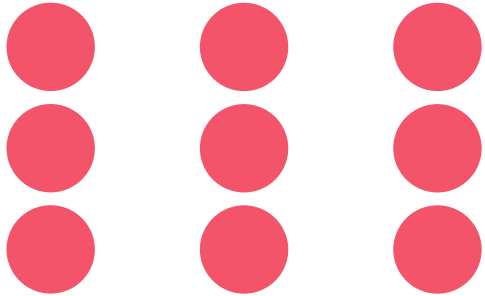
What do you see?

We perceive what we expect
perception biased by context

THE CHT

Our vision is optimized to see Structure

Gestalt Principle: Proximity

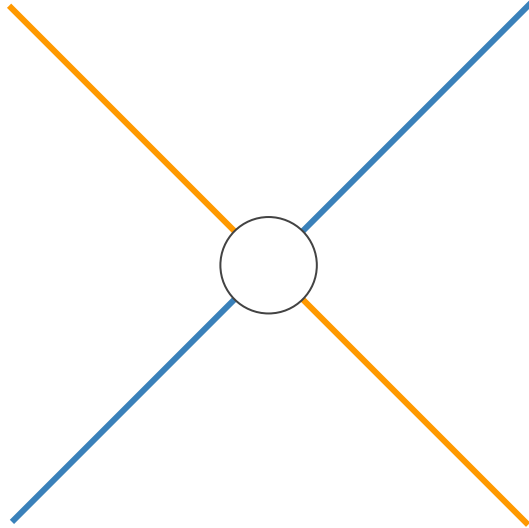


Lines or columns?

Our vision is optimized to see Structure
Gestalt Principle: Similarity

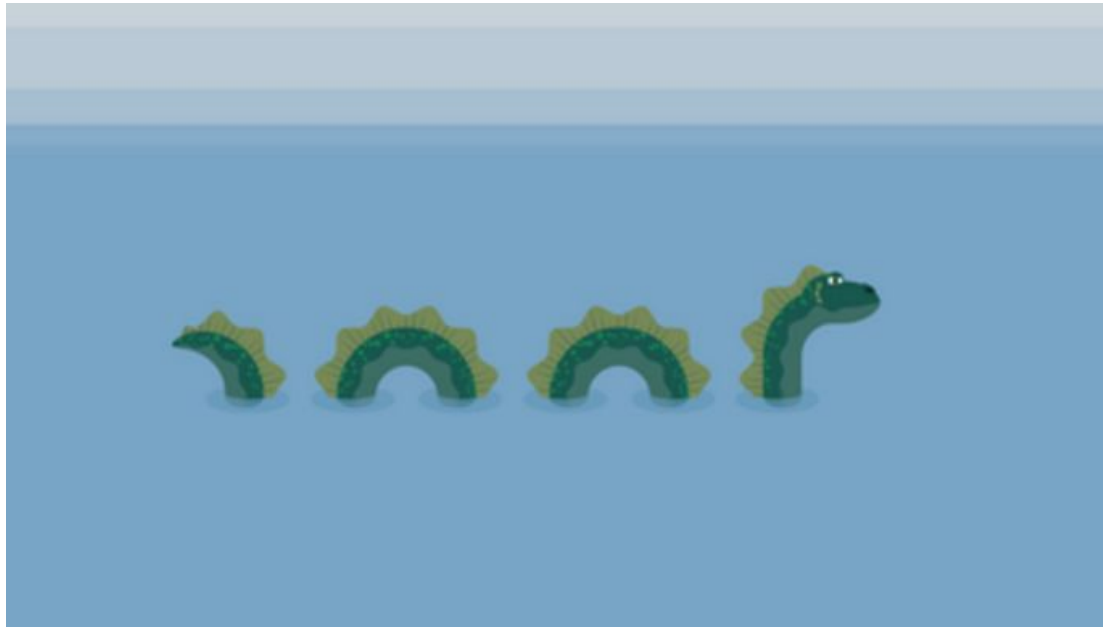


Our vision is optimized to see Structure
Gestalt Principle: Continuity



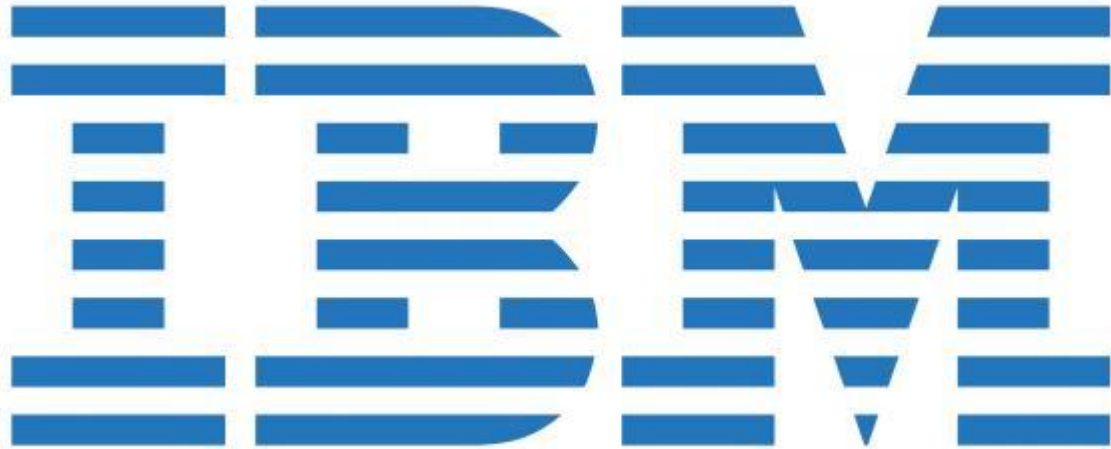
Our vision is optimized to see Structure

Gestalt Principle: Continuity



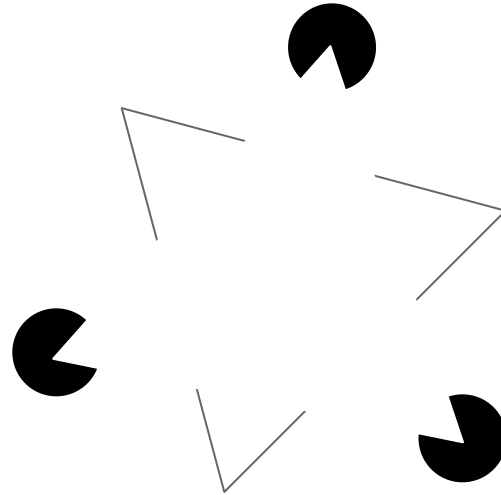
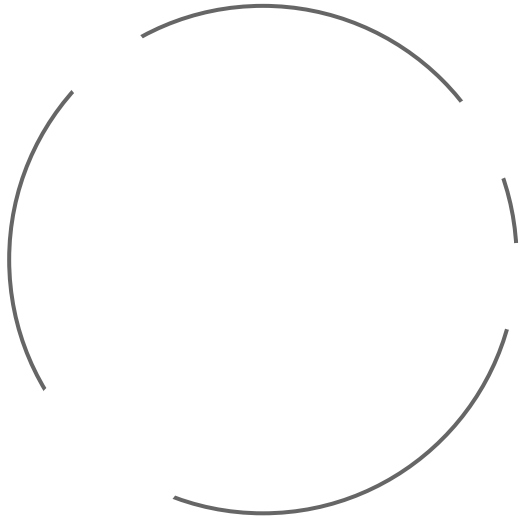
Our vision is optimized to see Structure

Gestalt Principle: Continuity



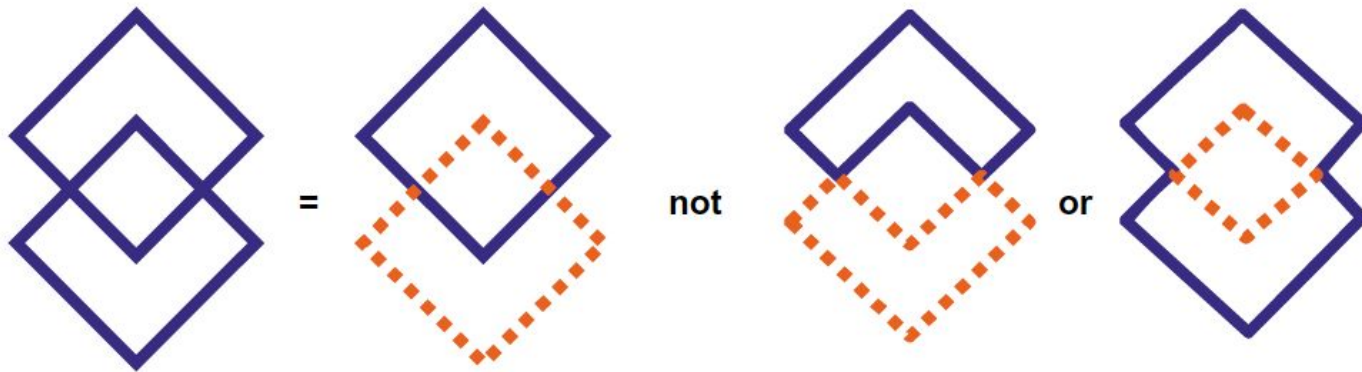
Our vision is optimized to see Structure

Gestalt Principle: Closure

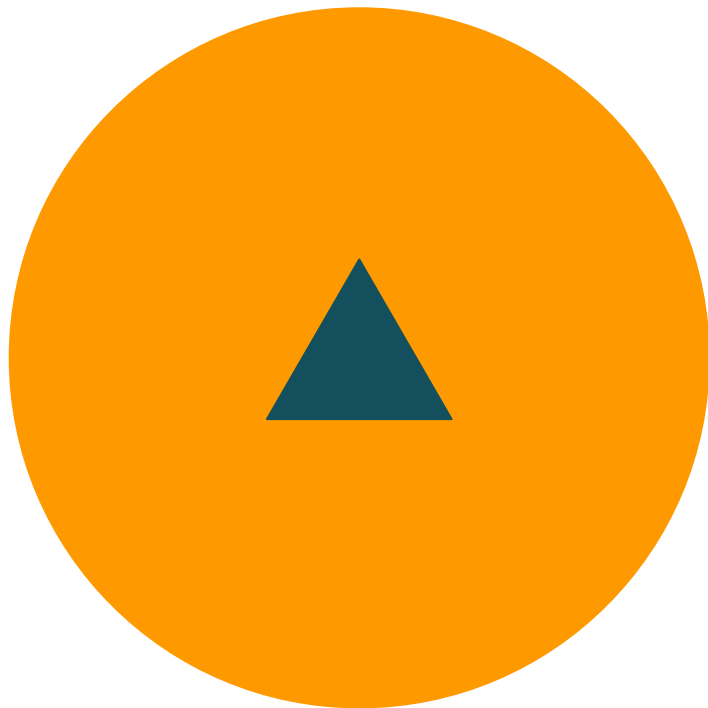


Our vision is optimized to see Structure

Gestalt Principle: Symmetry



Our vision is optimized to see Structure
Gestalt Principle: Figure / Ground



Our vision is optimized to see
Structure

**Gestalt Principle: Figure /
Ground**

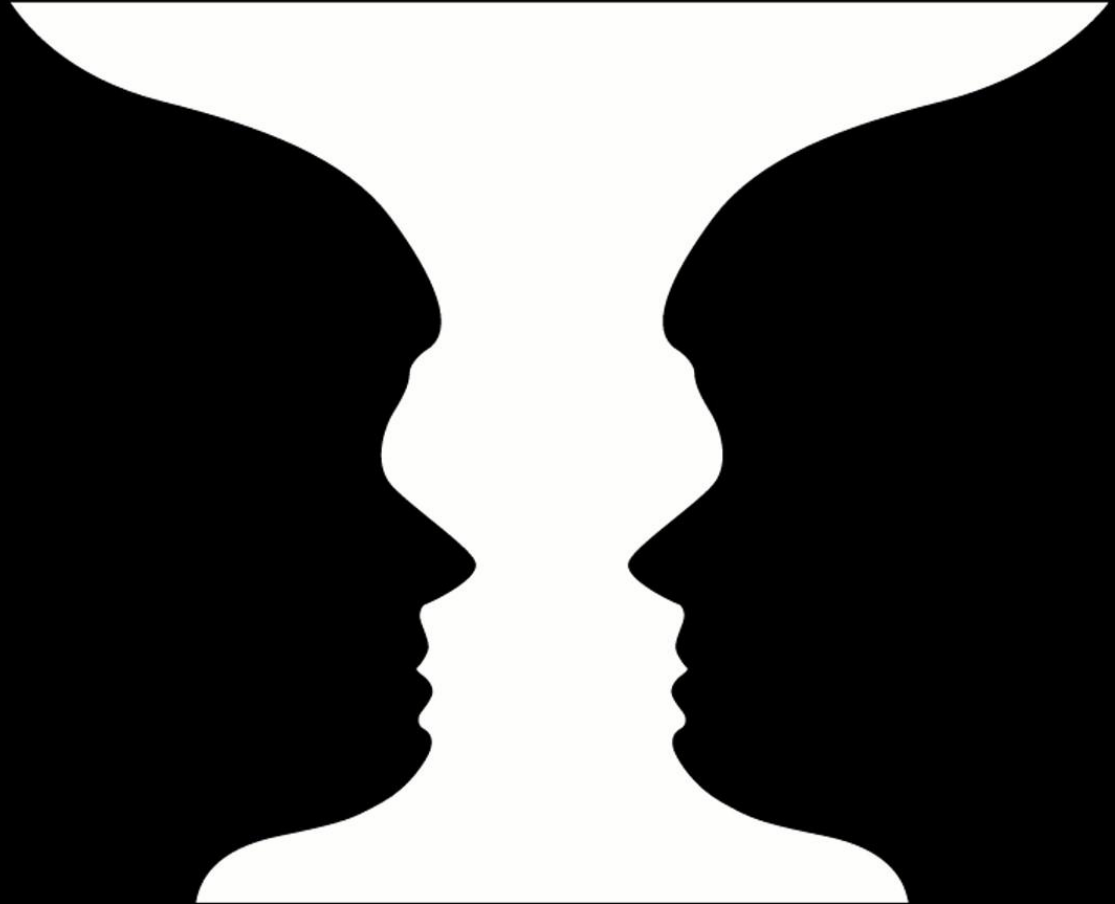


**Our vision is
optimized to see
Structure**

Gestalt

Principle:

Figure / Ground

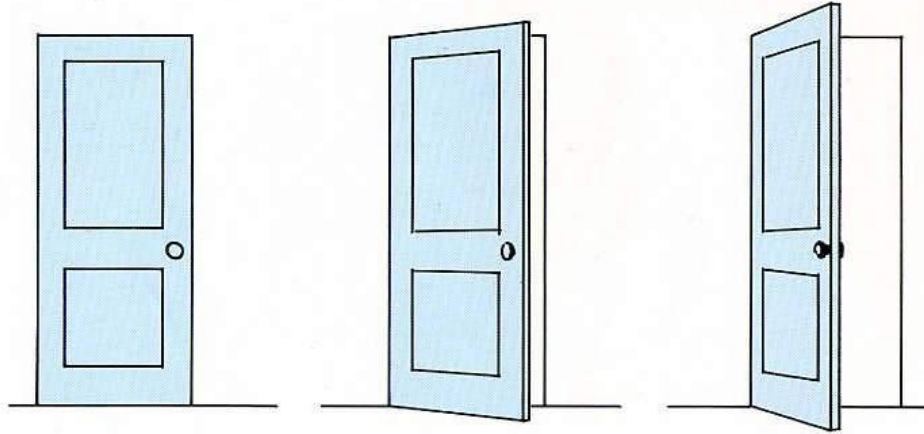


**Our vision is optimized to
see Patterns**

Common fate



Shape Constancy



We perceive the form of familiar objects as constant even our retinal images of the, change.

You can see how the doors are changing as they are being opened.

Attention



Attention





3.

About Design

Designing to understanding

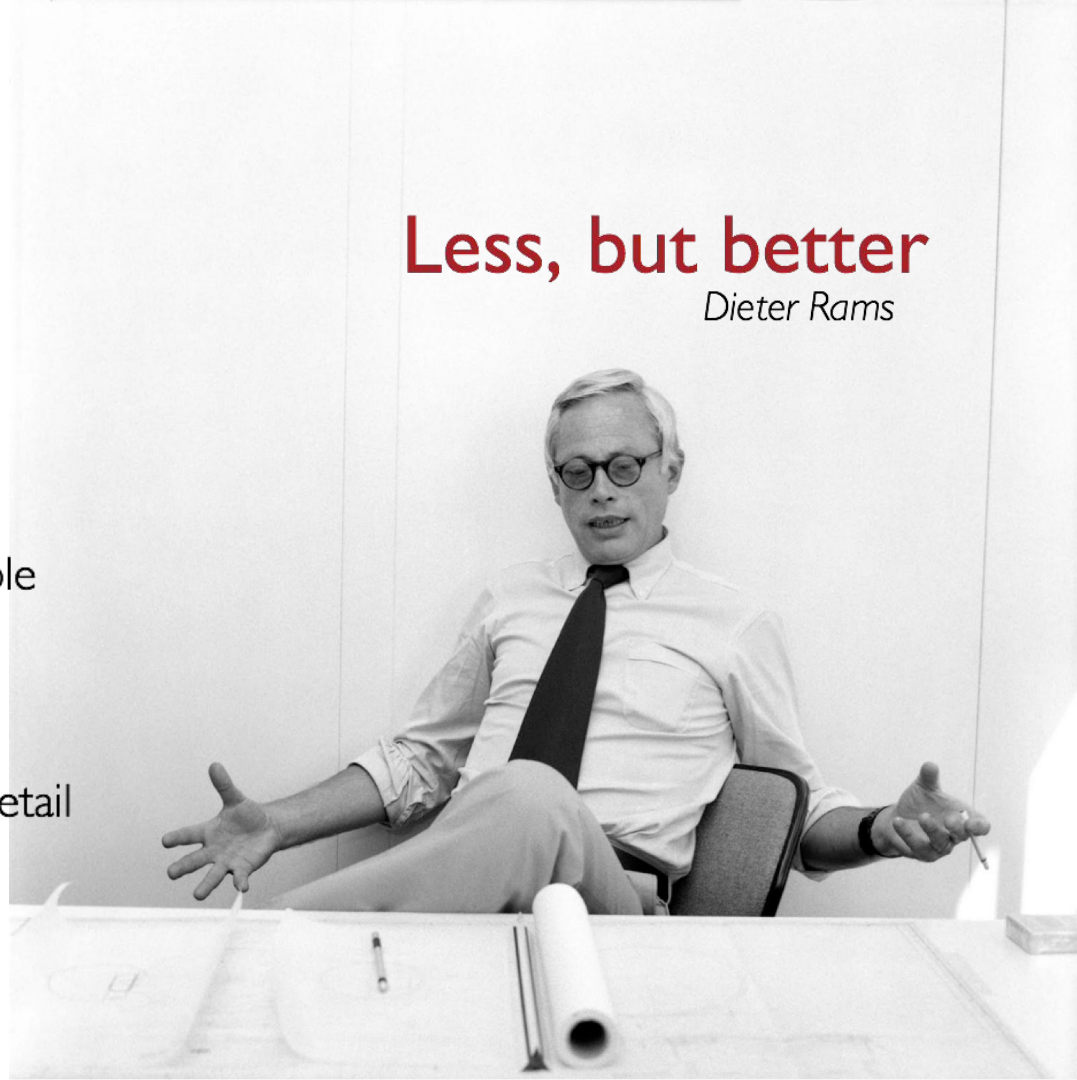
Design Rules

Good design

1. Is innovative
2. Makes a product useful
3. Is aesthetic
4. Makes a product understandable
5. Is unobtrusive
6. Is honest
7. Is long-lasting
8. Is thorough down to the last detail
9. Is environmentally friendly
10. Is as little design as possible

Less, but better

Dieter Rams



Design



Dieter Rams changed industrial design by creating beautiful products for Braun. The most successful companies of today, including Apple, use his designs.

Design Sketches



How can we use it?

Affordance



Design Concepts

Visual Elements

Background
Perspective
Color
Text
Images

Arrangement

Contrast
Flow
Alignment
Hierarchy
Unity
Proximity
Empty space

Movement

Timing
Pace
Distance
Direction
Eye-flow

Design Flow



first here

then
down



end here

Design Flow



**We look at
where people
look**

Design Flow



Diagonal

Design Flow

Media: Diapers-07.jpg
Time: 00:00:00 - 00:00:06.033
Participant: filter_48

21.75 sec



Extra gentle for the most sensitive skin.

So gentle for sensitive skin, add the chemicals and moisture to help prevent you have diaper rash.

Baby Wipes's unique high-absorbency natural-blend cotton provides cotton-soft, extra thick, gel-free protection for your baby's sensitive skin. The chlorine-free materials and absorbent polymers is non-toxic and non-irritating. Clinically tested and pediatrician recommended for babies with allergies and sensitive skin.



If you are not satisfied with the baby leakage protection, you will get your money back. Read more about our leakfree guarantee at www.baby.com

Participant: filter_48

10.43 sec



Extra gentle for the most sensitive skin.

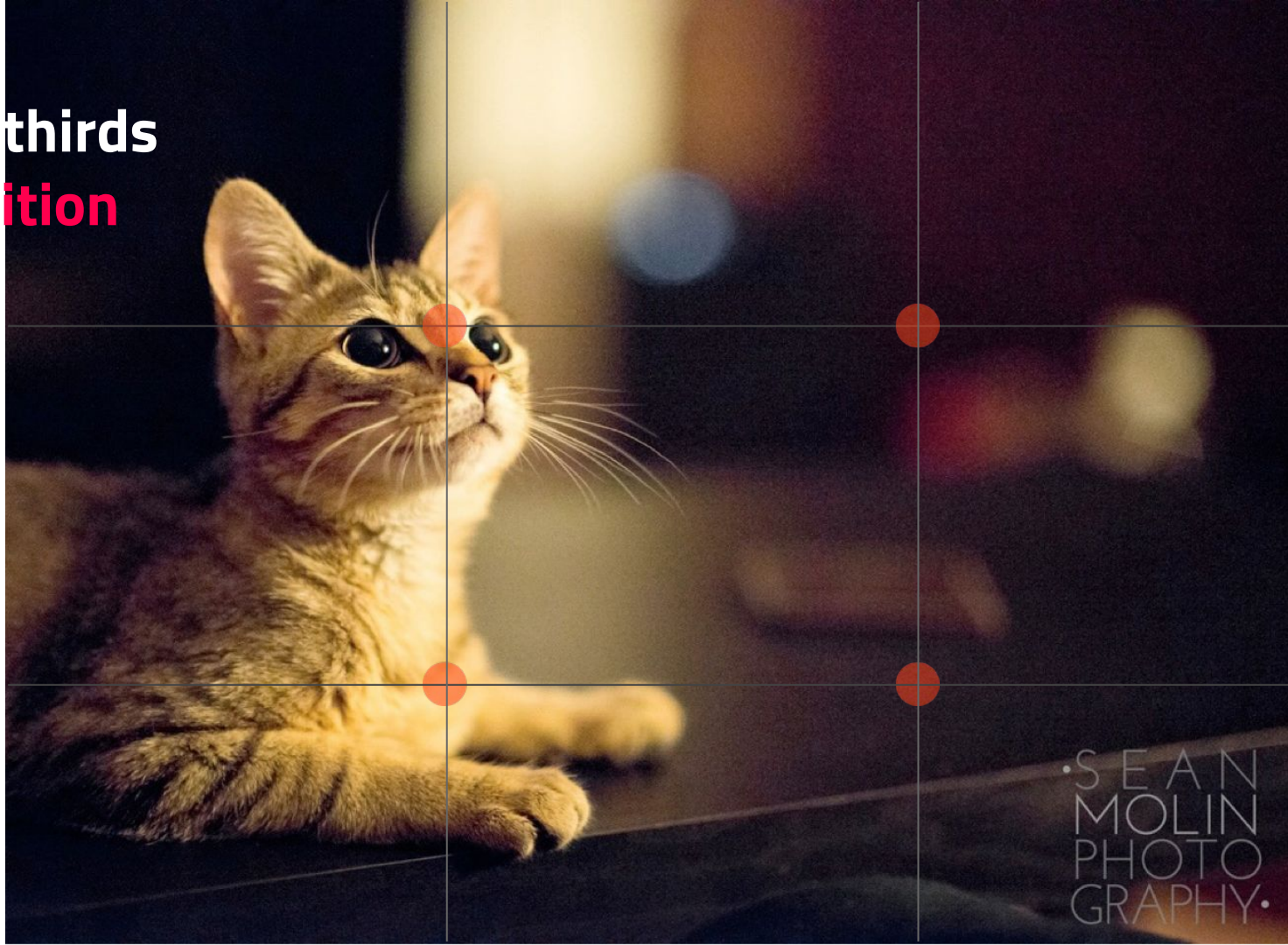
So gentle for sensitive skin, add the chemicals and moisture to help prevent you have diaper rash.

Baby Wipes's unique high-absorbency natural-blend cotton provides cotton-soft, extra thick, gel-free protection for your baby's sensitive skin. The chlorine-free materials and absorbent polymers is non-toxic and non-irritating. Clinically tested and pediatrician recommended for babies with allergies and sensitive skin.



If you are not satisfied with the baby leakage protection, you will get your money back. Read more about our leakfree guarantee at www.baby.com

Rule of thirds Composition



Rule of thirds Composition



We Seek and Use Visual Structure

Text

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

You are booked on United flight 237, which departs from Auckland at 14:30 on Tuesday 15 Oct and arrives at San Francisco at 11:40 on Tuesday 15 Oct.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

Flight: United 237, Auckland → San Francisco

Depart: 14:30 Tue 15 Oct

Arrive: 11:40 Tue 15 Oct

We Seek and Use Visual Structure Text

Licenses & ID Cards: Renewals, Duplicates, Changes

- Renew license: [in person](#) [by mail](#) [by Internet](#)
- Renew: [instruction permit](#)
- Apply for duplicate: [license](#) [ID card](#)
- Change of: [name](#) [address](#)
- Register as: [organ donor](#)

Renewals, Duplicates, and Information Changes for Driver Licenses and/or ID Cards

- [How to renew your driver license in person](#)
- [How to renew your driver license by mail](#)
- [How to renew your driver license by Internet](#)
- [How to renew your instruction permit](#)
- [How to apply for a duplicate driver license or identification \(ID\) card](#)
- [How to change your name on your driver license and/or identification \(ID\) card](#)
- [How to notify DMV of my change of address](#)
- [How to register for the organ donor gift of life program](#)

We Seek and Use Visual Structure Text

Mortgage Summary

\$1,840.59	\$662,611.22
Monthly Payment	Total of 360 Payments
\$318,861.22	Sep, 2037
Total Interest Paid	Pay-off Date
\$93,750.00	\$0.00
Total Tax Paid	Total PMI Paid

Mortgage Summary

<i>Monthly Payment</i>	\$ 1,840.59
<i>Number of Payments</i>	360
<i>Total of Payments</i>	\$ 662,611.22
<i>Interest Total</i>	\$ 318,861.22
<i>Tax Total</i>	\$ 93,750.00
<i>PMI Total</i>	\$ 0.00
<i>Pay-off Date</i>	Sep 2037

Visual Hierarchy

Text

Create a Clear Visual Hierarchy

Organize and prioritize the contents of a page by using size, prominence, and content relationships. Let's look at these relationships more closely.

The more important a headline is, the larger its font size should be. Big bold headlines help to grab the user's attention as they scan the Web page. The more important the headline or content, the higher up the page it should be placed. The most important or popular content should always be positioned prominently near the top of the page, so users can view it without having to scroll too far. Group similar content types by displaying the content in a similar visual style, or in a clearly defined area.

Create a Clear Visual Hierarchy

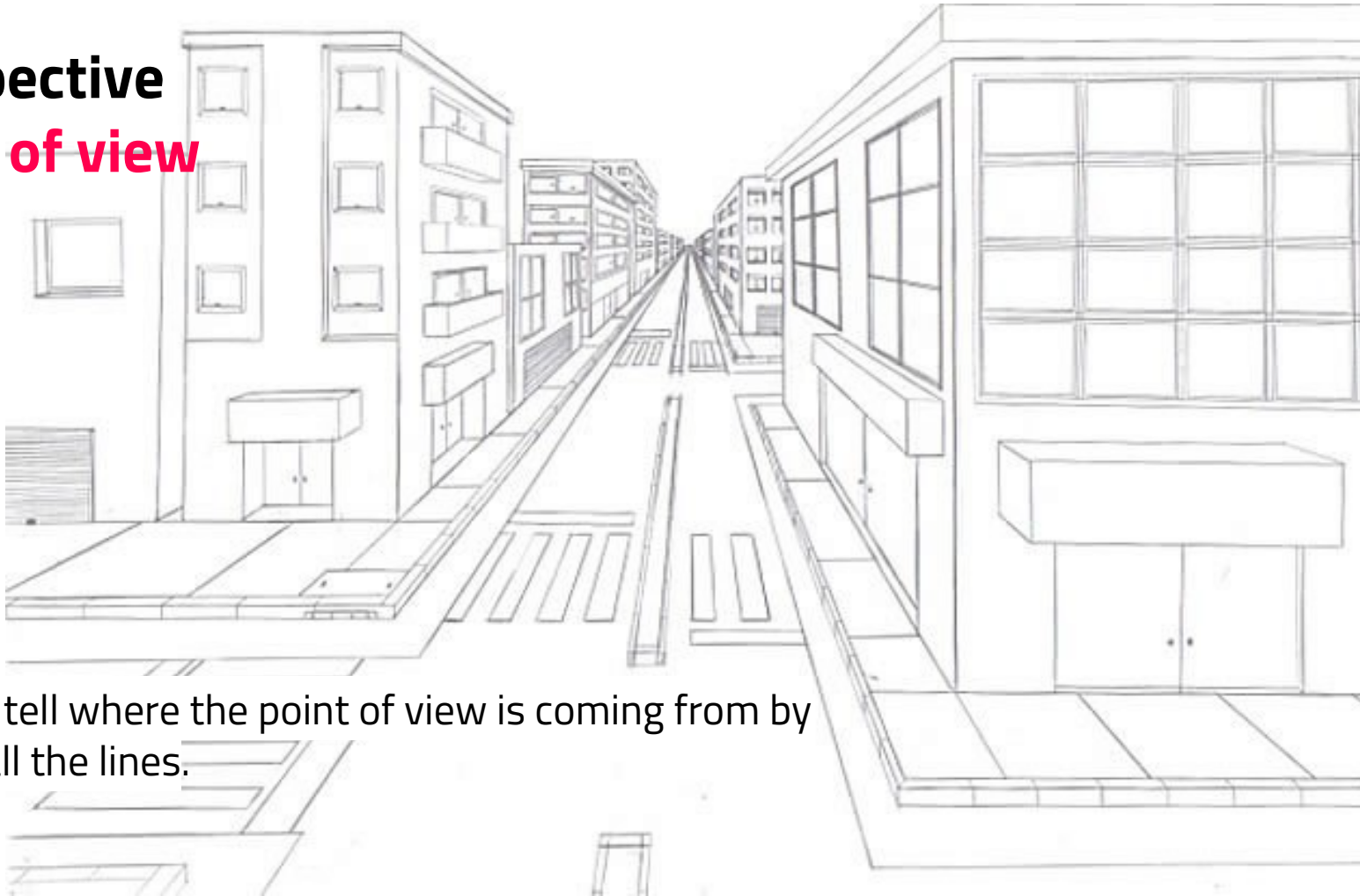
Organize and prioritize the contents of a page by using size, prominence, and content relationships.

Let's look at these relationships more closely:

- **Size.** The more important a headline is, the larger its font size should be. Big bold headlines help to grab the user's attention as they scan the Web page.
- **Prominence.** The more important the headline or content, the higher up the page it should be placed. The most important or popular content should always be positioned prominently near the top of the page, so users can view it without having to scroll too far.
- **Content Relationships.** Group similar content types by displaying the content in a similar visual style, or in a clearly defined area.

Perspective

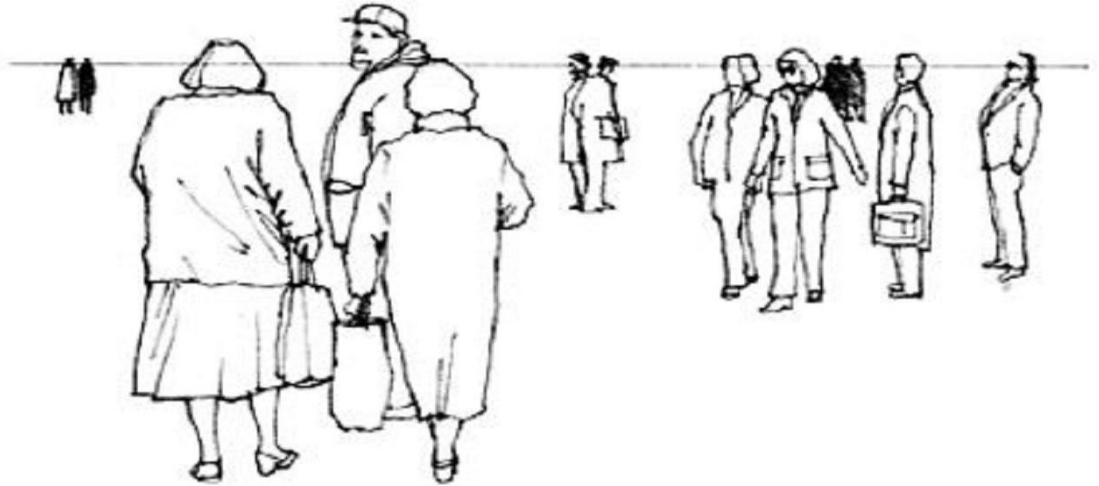
Point of view



You can tell where the point of view is coming from by seeing all the lines.

Relative size

Point of view



The smaller image is perceived as being farther away.

4.

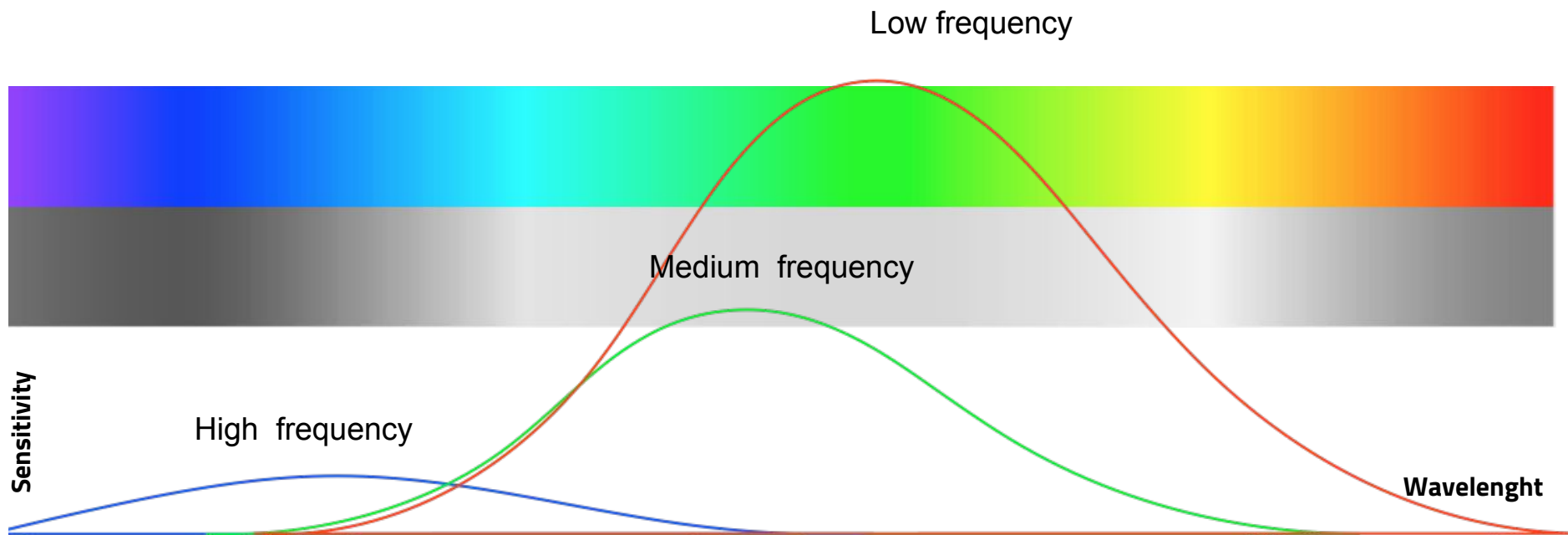
About Color

Color in Visualization

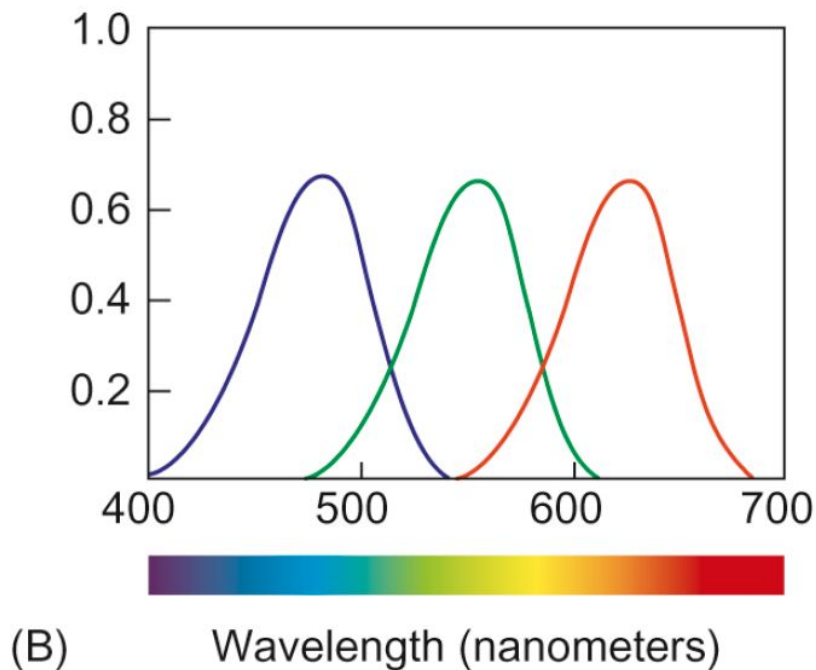
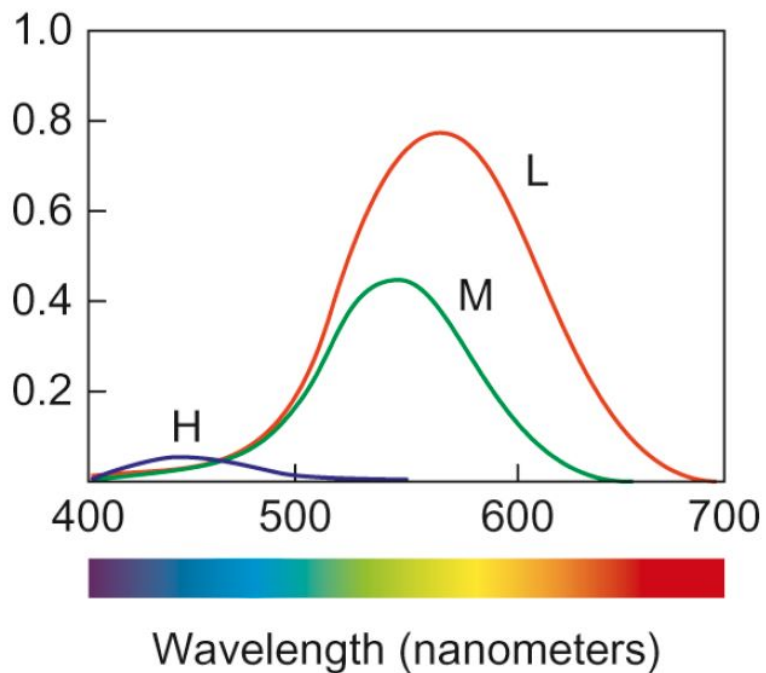
Color Concepts

- **Hue** is color (blue, green, red, etc.).
- **Chroma** is the purity of a color (a high chroma has no added black, white or gray).
- **Saturation** refers to how strong or weak a color is (high saturation being strong).
- **Value** refers to how light or dark a color is (light having a high value).
- **Tones** are created by adding gray to a color, making it duller than the original.
- **Shades** are created by adding black to a color, making it darker than the original.
- **Tints** are created by adding white to a color, making it lighter than the original.

Color Concepts

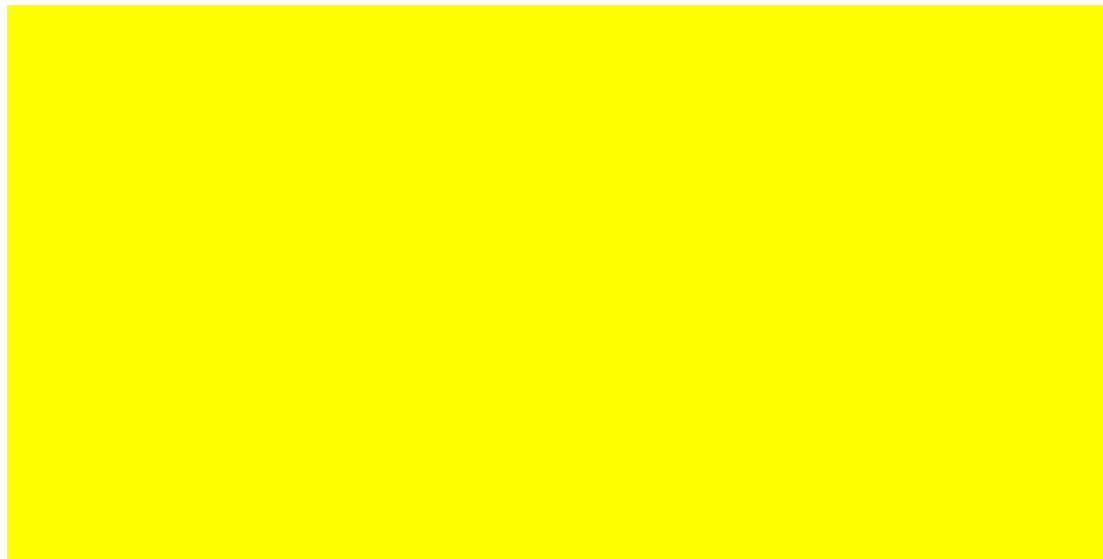


Color Concepts



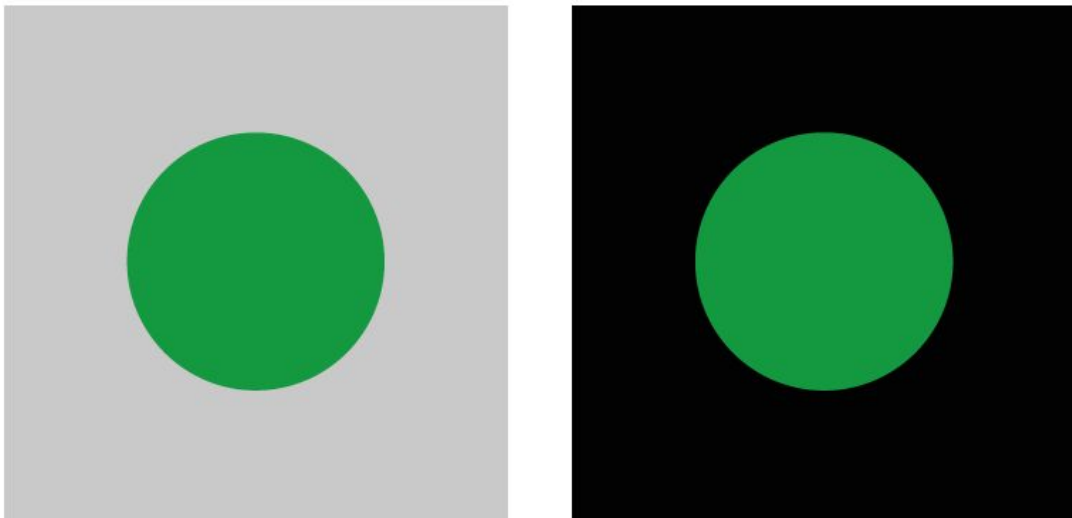
Color

Rainbow Scale problems I



Color

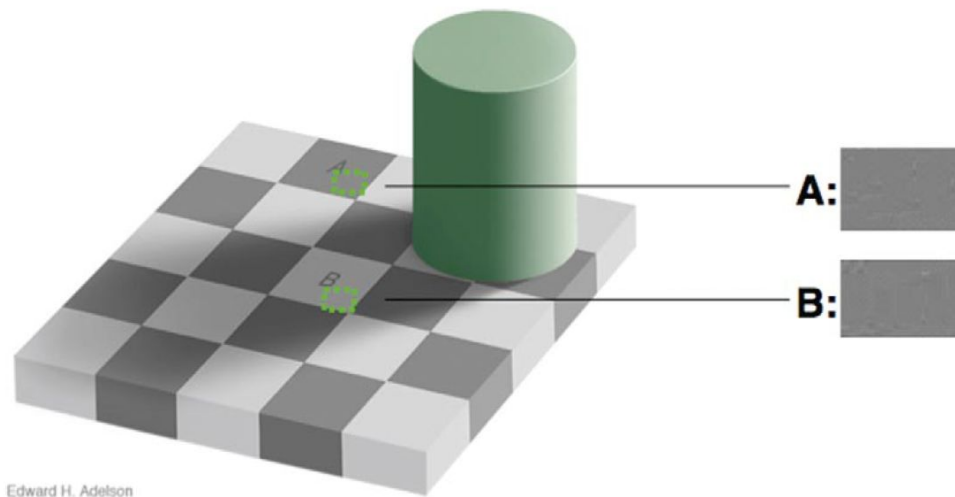
Our vision is optimized for contrast



the same. They appear as different shades because their backgrounds are different, but they are

Color

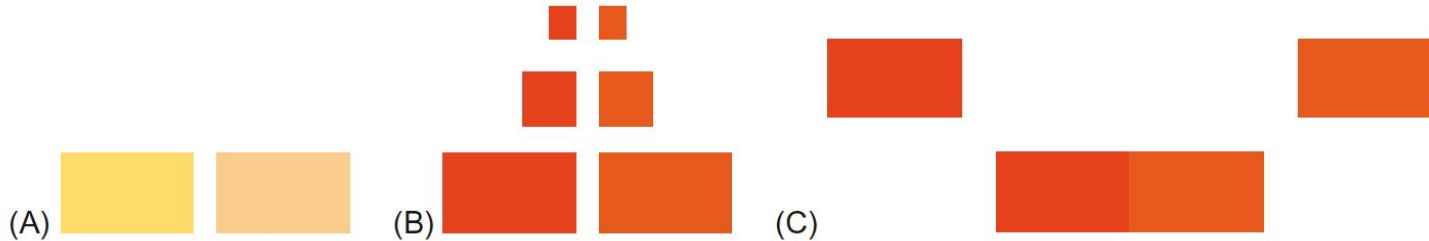
Our vision is optimized for contrast



The squares marked A and B are the same gray. We see B as white because it is "shaded."

Color

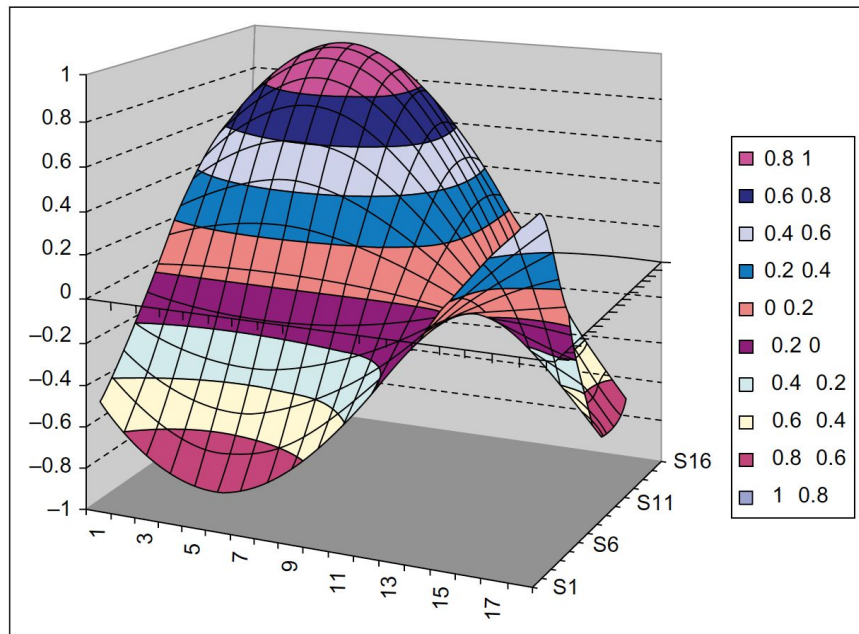
Ability to discriminate colors depends on how colors are presented



Factors affecting the ability to distinguish colors: (A) paleness, (B) size, (C) separation.

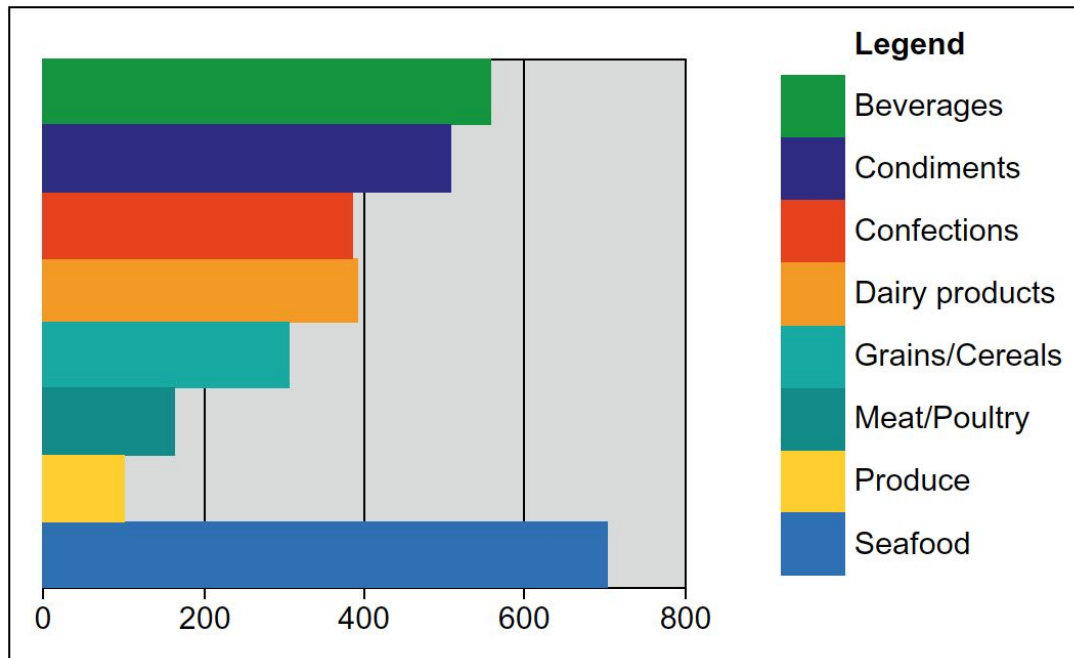
Color

Ability to discriminate colors



Color

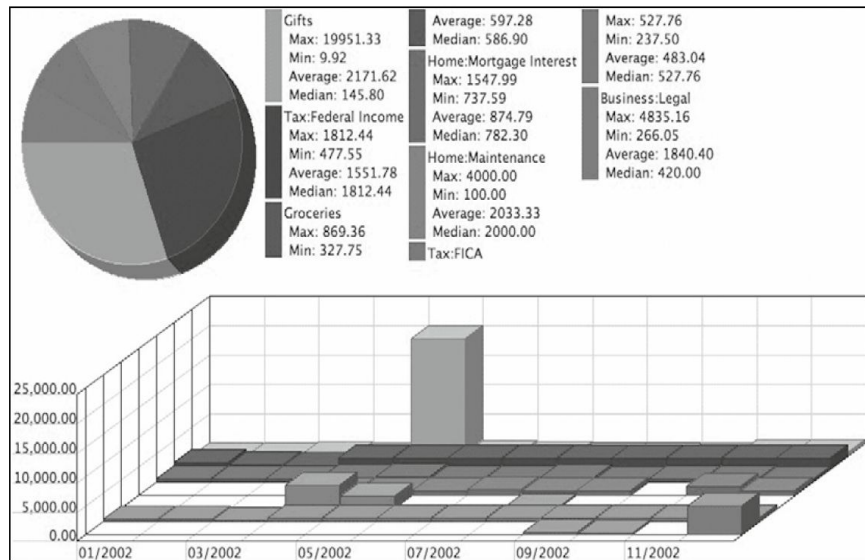
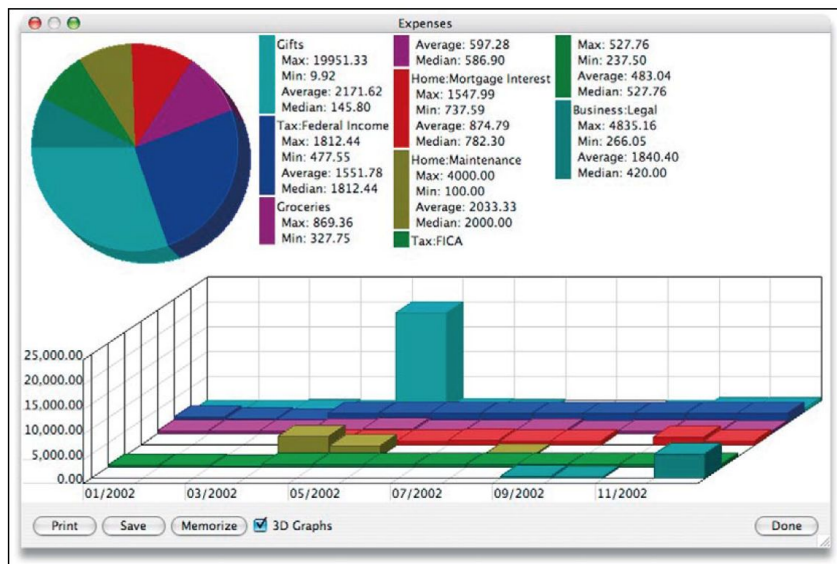
Ability to discriminate colors



Large color patches make it easier to distinguish the colors.

Color

Color-Blindness



Graph uses colors some users can't distinguish./ graph rendered in grayscale.

Color

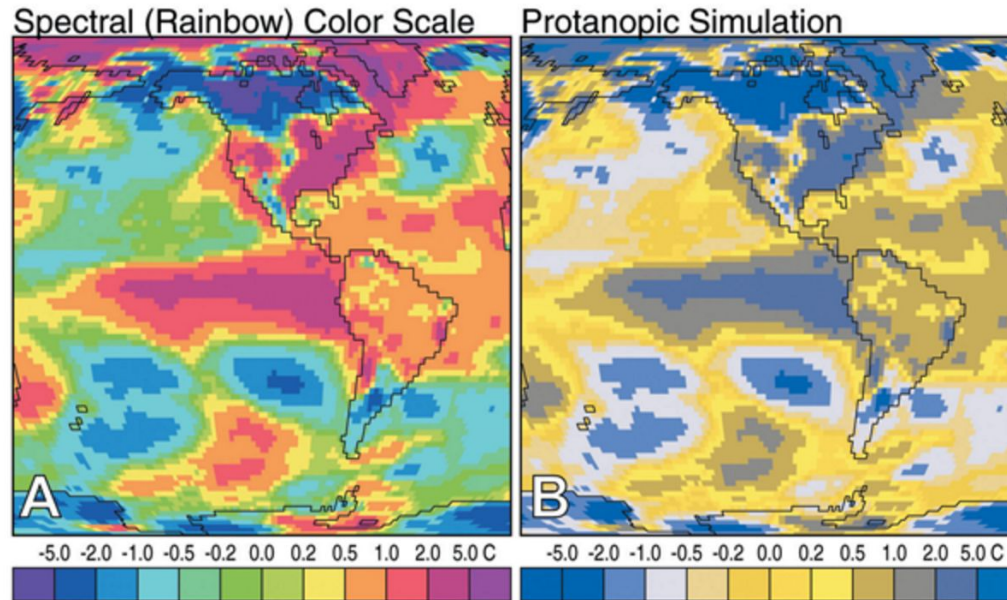
Rainbow Scale problems I



The spectral order of hues has no inherent meaning.

Color

Rainbow Scale problems I



Color

Opponent colors

AVOID

THIS!

Opponent colors, placed on or directly next to each other, clash.

Color Tools

I want hue

Color space

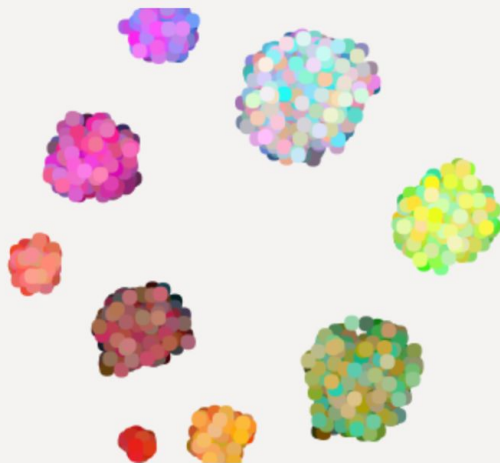
Presets... ▾

H 0 360

C 0 3

L 0 1.5

☐ Dark background



Palette

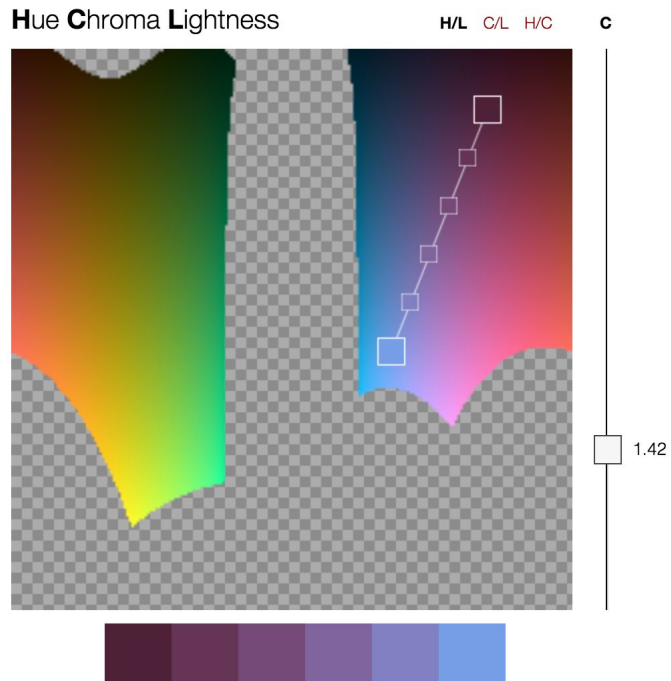
9 colors hard (Force vector) ▾

↻ Reroll palette



Color Tools

HCL Editor



<http://vis4.net/labs/colorvis/embed.html?m=hcl&gradients=6>

Color Tools

Kuler



<https://color.adobe.com/create/color-wheel/>

Color Tools

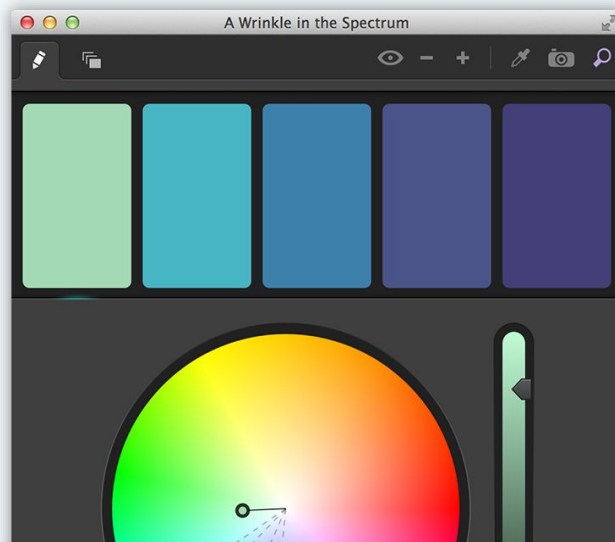
Spectrum

Intuitively design beautiful color schemes.

Spectrum is the ultimate app for creating and managing color schemes — for designers and developers.

Get Spectrum

Video Tour



<http://vis4.net/labs/colorvis/embed.html?m=hcl&gradients=6>

Color Tools

xScope



xScope

4.0

Measure. Inspect. Test.

Download Free Trial

Mac OS X 10.8 or later

Buy for \$49⁹⁹

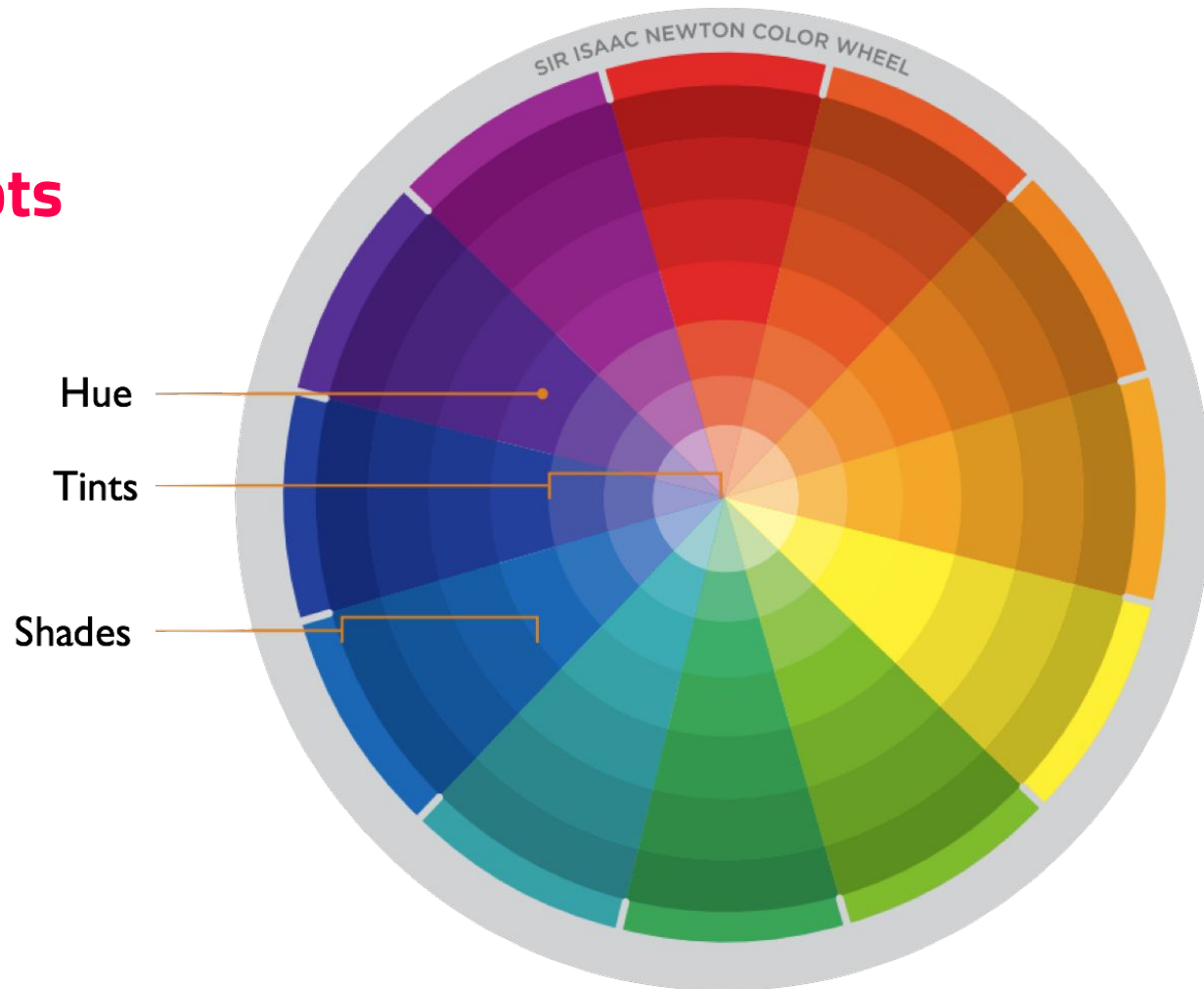
Also on the [Mac App Store](#)

Need more than one license? [Save money!](#)

A powerful set of tools that are ideal for measuring,
inspecting & testing on-screen graphics and layouts.

<http://xscopeapp.com/>

Color Concepts



Color Concepts

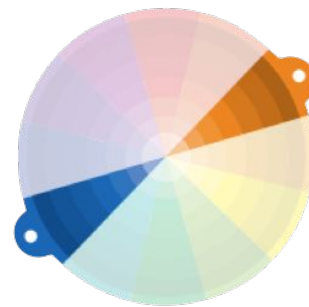
monochrome



analogous



complementary



Color Concepts

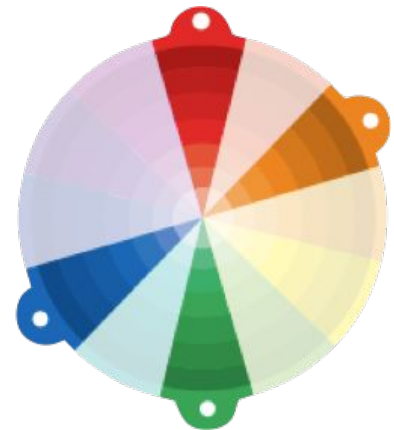
split
complementary



triadic

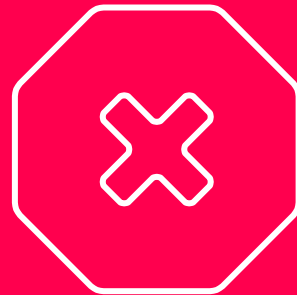


tetradic



Color Summary

- Our vision is optimized to detect **contrasts** (edges), not absolute brightness.
- Our ability to **distinguish colors depends on how colors are presented.**
- Some people have **color-blindness.**
- The user's display and **the viewing conditions affect color perception.**
- **Don't use the rainbow color scale**

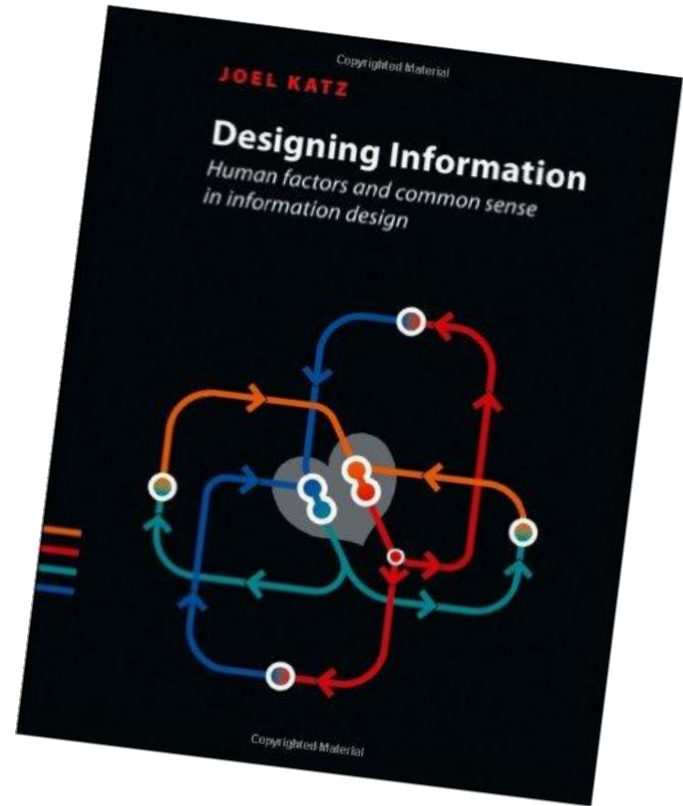


5. Bad practices

in Visualization

Designing information

Joel Katz



In two or three columns

Information

Is what you must
communicate.

Uninformation

It isn't necessarily
important
It (probably) isn't untrue

Designer's paradise

if it's appearing to be
information... this is...
noninformation

Misinformation

Something presented as
information to distort,
confuse, and mislead.

Not necessarily deliberate...
this is... *disinformation*



Information

Vitally important



Uninformation

Probably (Not untrue / Not important)
Possibly interesting



Noninformation

Probably (Not important)
Possibly (true/not true/confusing)



Misinformation

Definitely no true



Disinformation

Deliberately no true

Propaganda

Could be true, could be false,
probably incomplete



Politicians love small children, don't they?
(from a 1940 pro-Hitler propaganda booklet)

HOW BABY BOOMERS DESCRIBE THEMSELVES

Viz problems

Wrong maths.

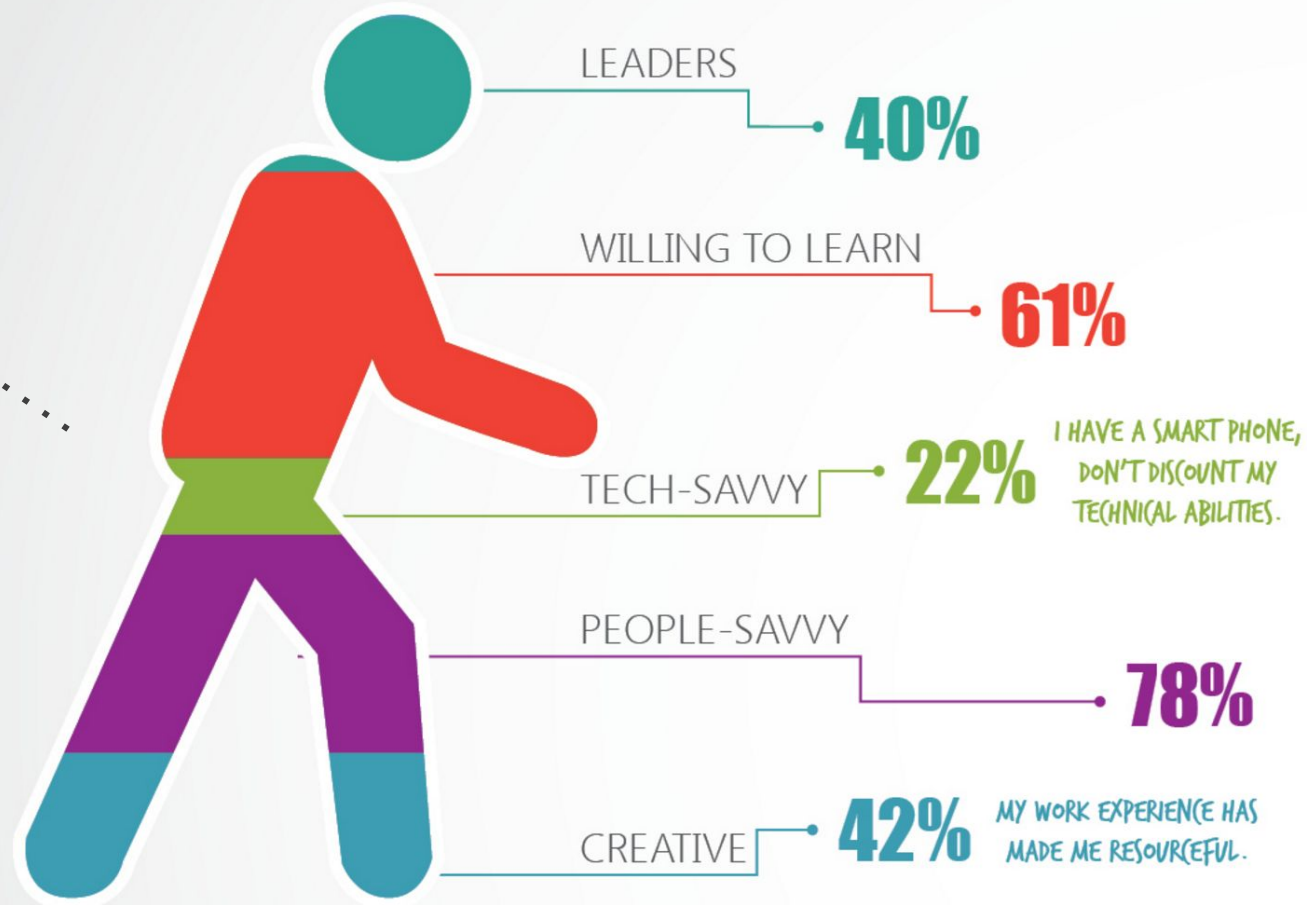


Diagram featured by <https://wpengine.com/wp-content/uploads/2014/03/Baby-Boomers.png>

Viz problems

Complex representation

Diagram featured by <https://wpengine.com/wp-content/uploads/2014/03/Anatomy-of-a-winning-TED-Talk.jpg>

Anatomy of a Winning TED Talk

1%

Sophisticated Visual Aids

We're not sure who puts the D in TED—most of the best presentations favor tepid PowerPoint slide shows (sorry, Brené Brown), Pictionary-quality drawings (really, Simon Sinek?), or no props at all.

5%

Opening Joke

Remember the one about the shoe salesman who went to Africa in the 1900s? That's how Benjamin Zander opened his talk—which turned out to be about classical music.

5%

Spontaneous Moment

Don't overprepare. Tease the guy in the front row ("You could light up a village with this guy's eyes"). Commend the stagehand who handles the human brain you brought.

5%

Statement of Utter Certainty

People come for answers—give 'em what they want, as Shawn Achor did: "By training your brain ... we can reverse the formula for happiness and success."

12%

Snappy Refrain

The TED equivalent of "I have a dream." Example: "People don't buy what you do; they buy why you do it." Repeat 7x.

23%

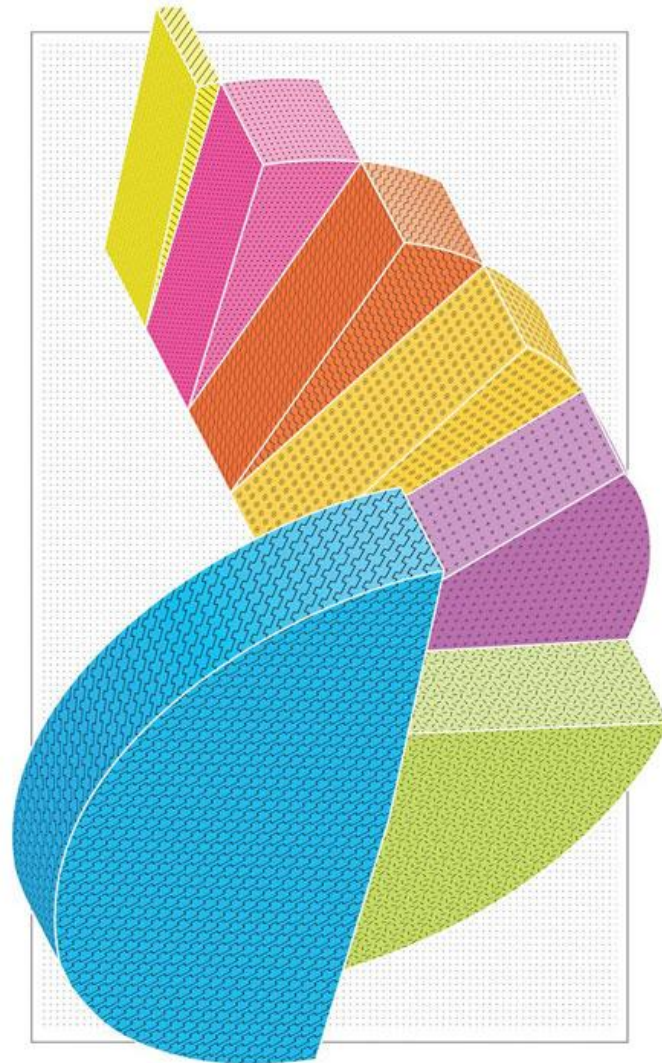
Personal Failure

Be relatable. We want to know about that nervous breakdown. Or at least the time you didn't fit in at summer camp.

49%

Contrarian Thesis

Wait a sec—we should be playing more videogames? The more choices we have, the worse off we are? TED is where conventional wisdom goes to die.

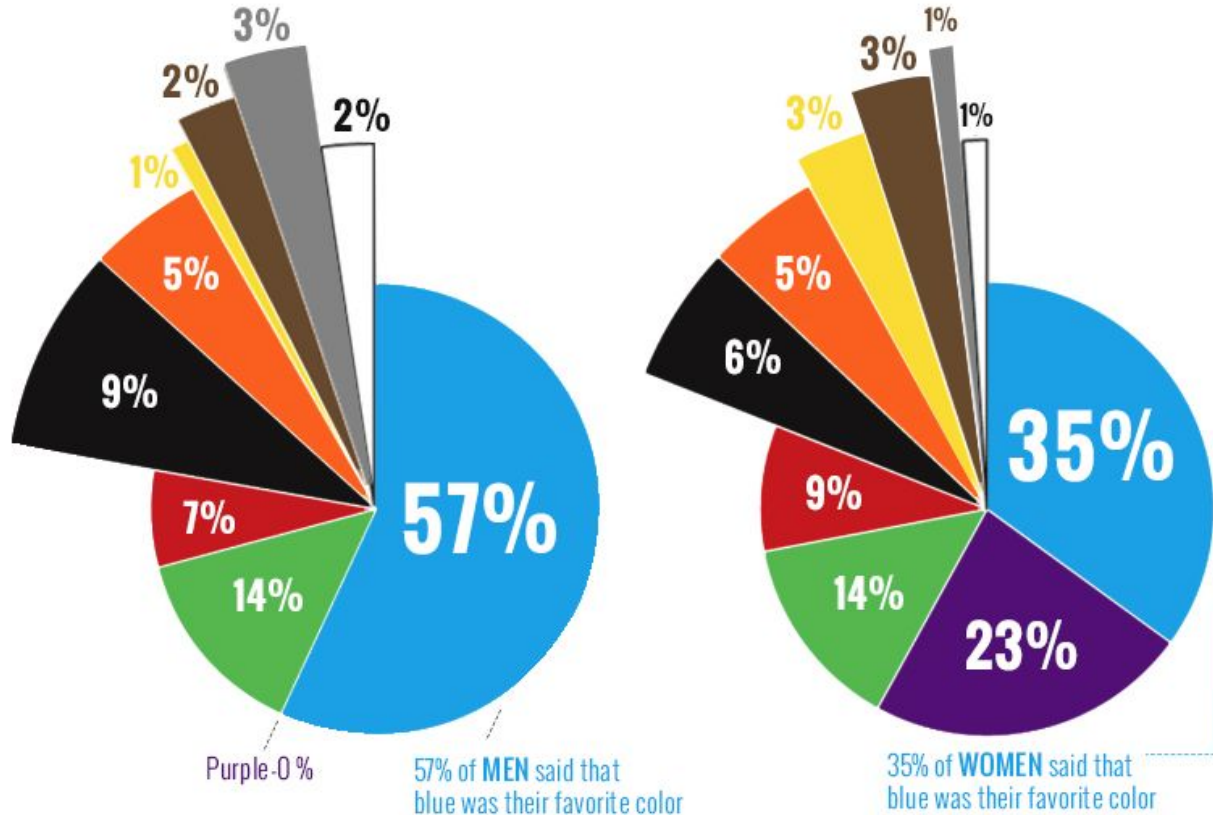


Viz problems

Complex representation

Diagram featured by <https://wpengine.com/wp-content/uploads/2014/03/Anatomy-of-a-winning-TED-Talk.jpg>

COLOR PREFERRED BY GENDER



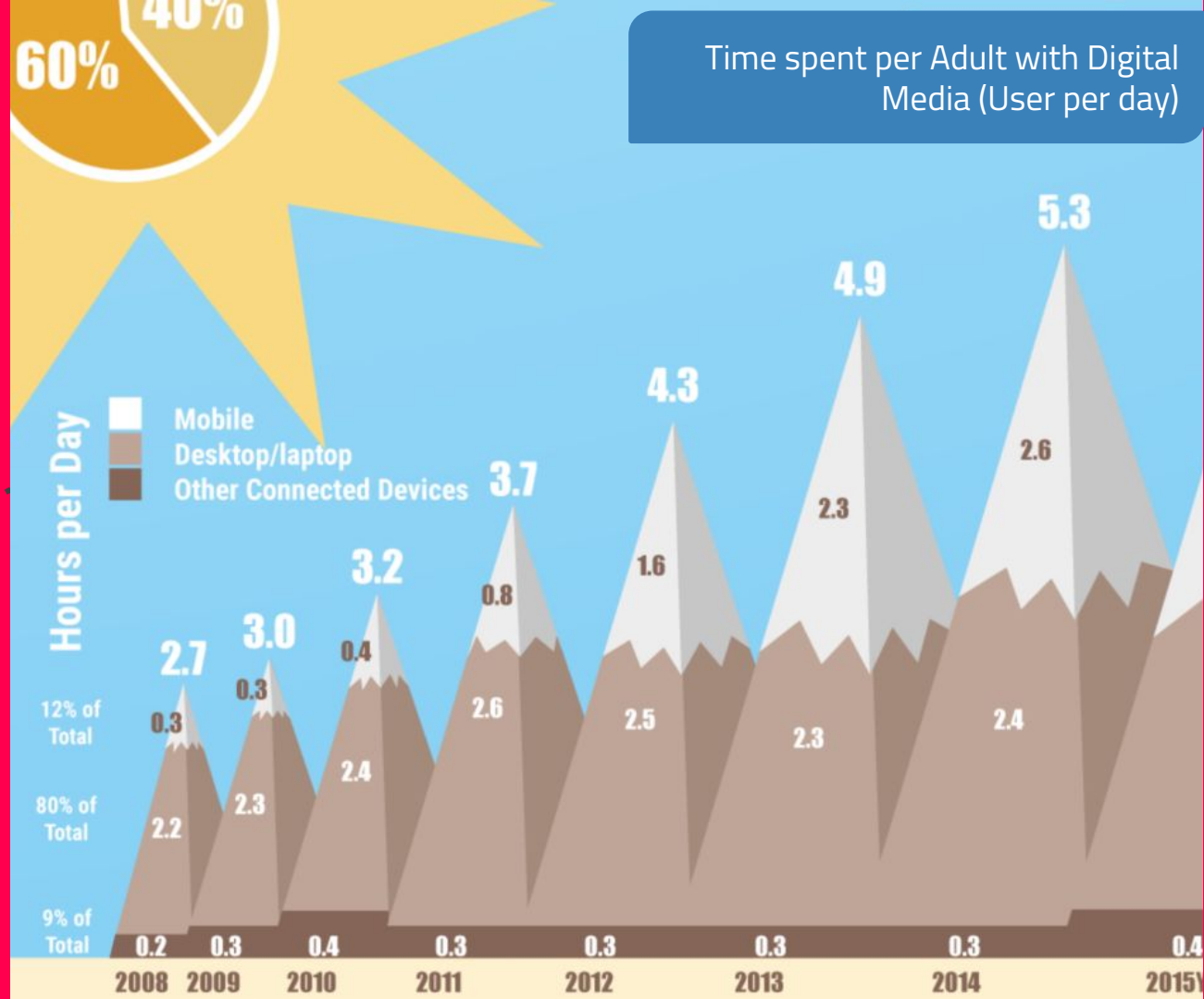
Too much information

PA Consulting Group
© PA Knowledge Limited 2009



Viz problems

Cognitive Dissonance



Visual problems

Not enough information

THE MOST COST-EFFECTIVE MARKETING CHANNELS

Further research by Smart Insights looked at how marketers rate channels for volume of leads or sales expected by the business.



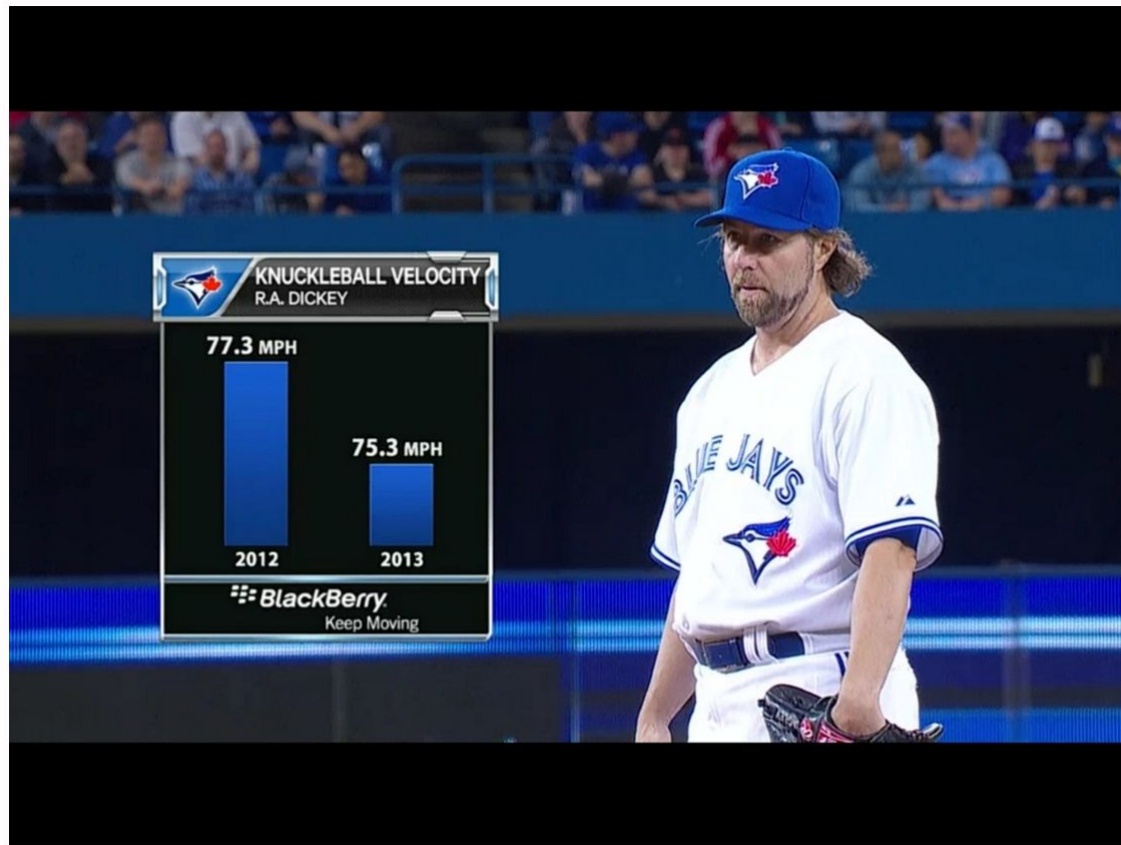
33% gave social media a medium-high to high rating. This is in comparison to display advertising (19%) and online PR (23%).

Only 4% said they didn't use social media. This is in comparison to SEO (5%), online PR (9%), paid search marketing (13%), and display advertising (16%).



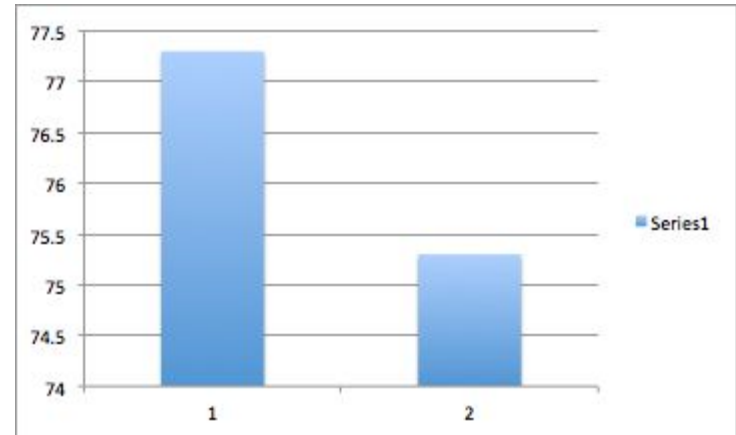
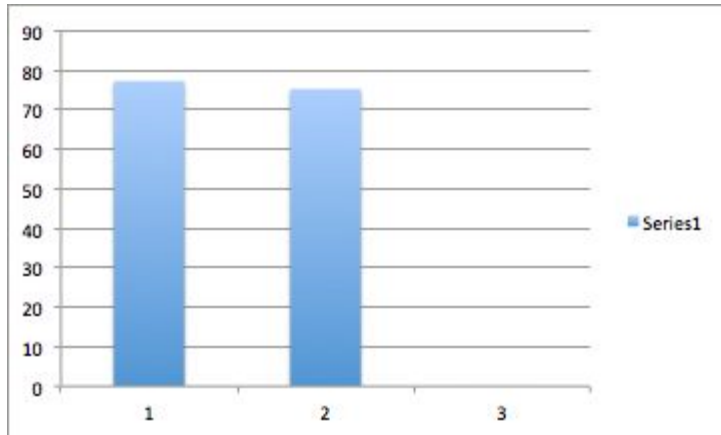
Graphs to deceive

Visual tricks



Graphs to deceive

Visual tricks



Graphs to deceive

Visual tricks



Graphs to deceive

Visual tricks

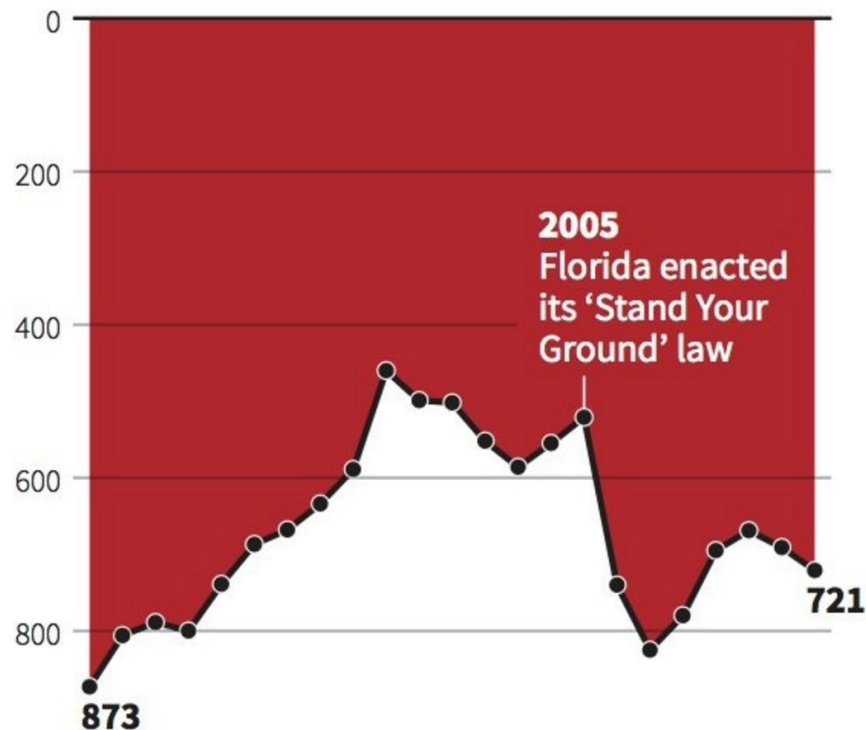


Graphs to deceive

Visual tricks

Gun deaths in Florida

Number of murders committed using firearms

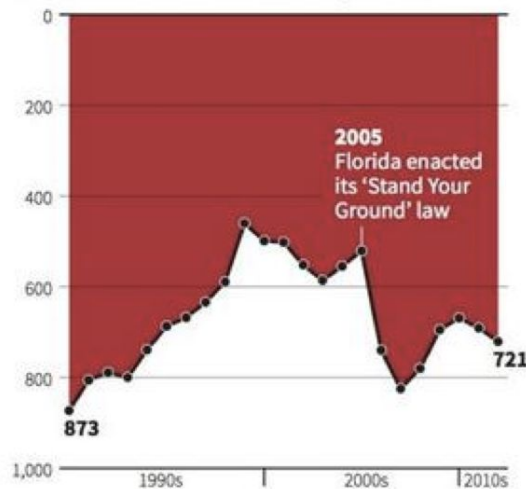


Graphs to deceive

Visual tricks

Gun deaths in Florida

Number of murders committed using firearms



Source: Florida Department of Law Enforcement

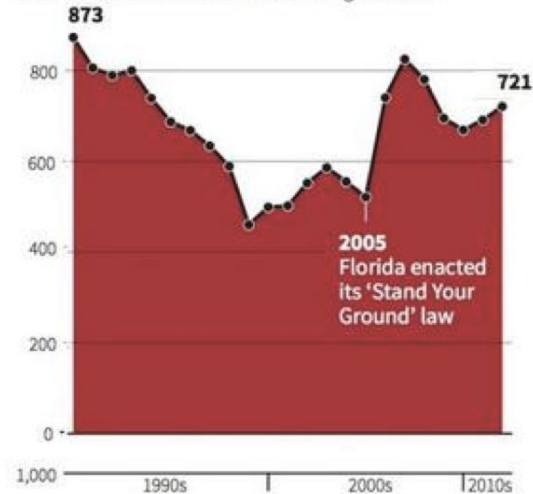
C. Chan 16/02/2014

REUTERS

BEFORE

Gun deaths in Florida

Number of murders committed using firearms



Source: Florida Department of Law Enforcement

C. Chan 16/02/2014

REUTERS

AFTER



Don't show
the data,
show the
truth

Moritz Stefaner

“

The ugly side of Visualization

<https://wpengine.com/blog/ugly-side-data-visualization/>





“ *Integrity summary*

- Axes should be
 - consistent (among them and with user experience)
 - well labeled
 - reach the origin (except for exceptional conditions)
- 3D plots usually distort quantities
- Use the proper plot type that facilitates the answers your readers will make
 - For quantitative: Lines>Bars>Circles>Angles>Colors

6.

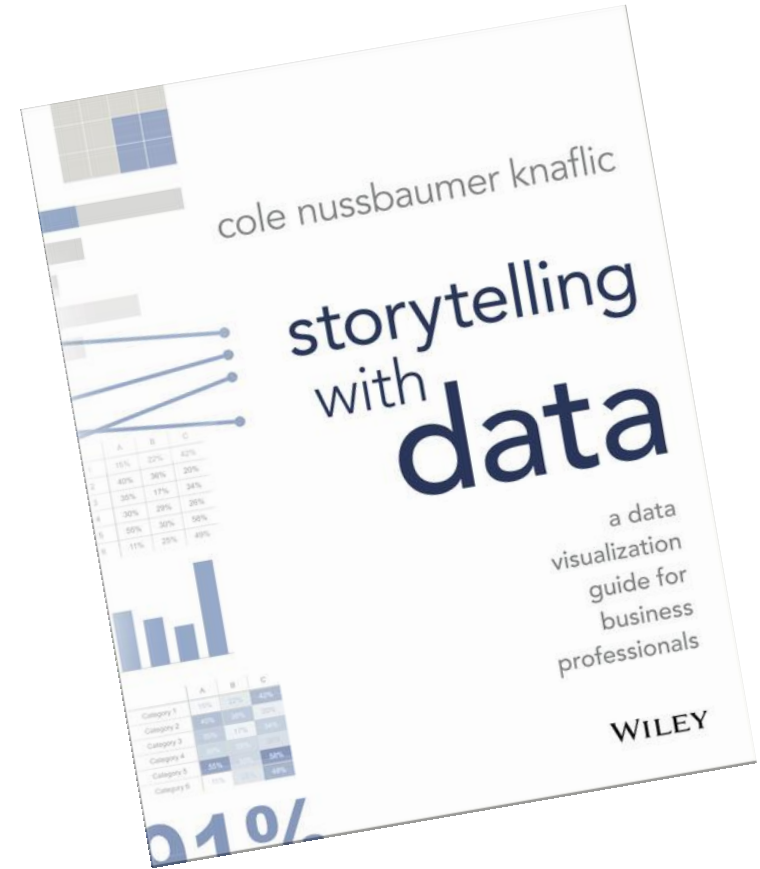
Some conclusions

Designing to understanding

Cole Nussbander

Storytelling with data

- **Focus attention**
- Tell a **story**



KNOW YOUR AUDIENCE



Exploratory Analysis vs. Explanatory Analysis

How do I explain it to my audience?

... **Who** is my audience?

IMPROVE YOUR AUDIENCE CAPABILITIES

221 History & Overview
267 Information Mathematics
267 General Topology
345 General Topology
480 Numerical Analysis
548 Logic
627 Statistics
690 Optimization & Control
700 Category Theory
781 K-Theory & Homotopy
816 Metric Geometry
890 Special Theory
1085 Symplectic Geometry
1324 Symplectic Algebra
1403 Commutative Algebra
1437 Operator Algebras
1505 Classical Analysis & ODEs
1505 Algebraic Topology
1528 Complex Variables
1623 Complex Variables
1732 Rings & Algebras
1905 Functional Analysis
1950 Group Theory
2112 Dynamical Systems
2393 Analysis of PDEs
2436 Probability Theory
2443 Geometric Topology
2530 Number Theory
2554 Quantum Algebra
2747 Representation Theory

3449 Differential Geometry

3578 Combinatorics

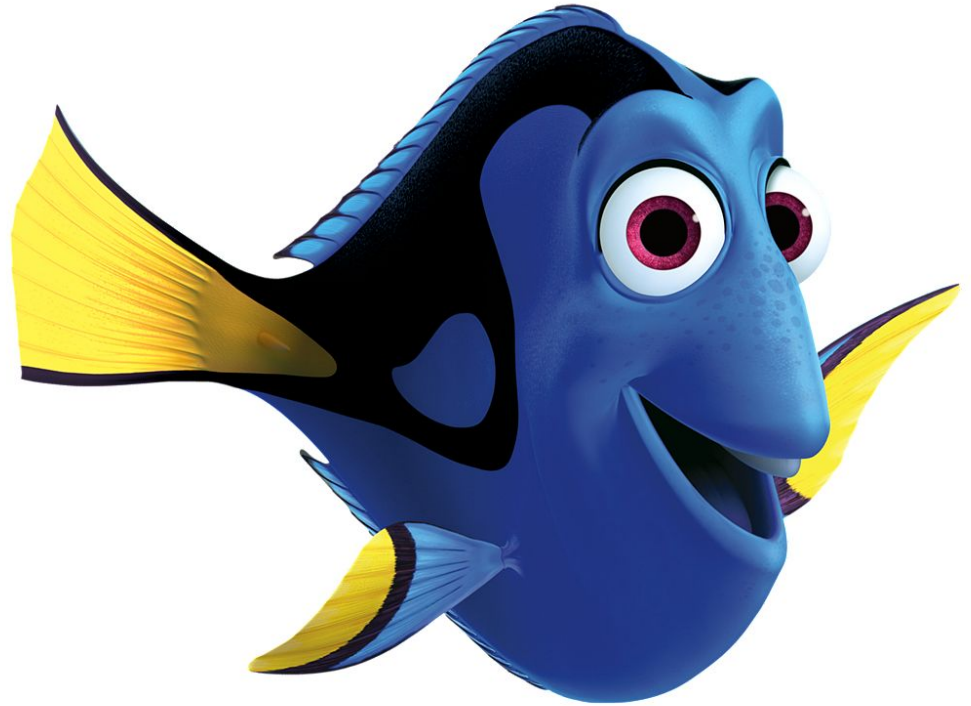
4704 Algebraic Geometry

4744 Mathematical Physics

Types of memory

Iconic memory

SUPER-short term



Our Attention is
limited,
Our memory is
imperfect
Jeff Johnson



15672902365283

61028456782838

48129002813456

12864327814560

15672902365283

61028456782838

48129002813456

12864327814560

Use Intensity

15672902365283

61028456782838

48129002813456

12864327814560

Contrast

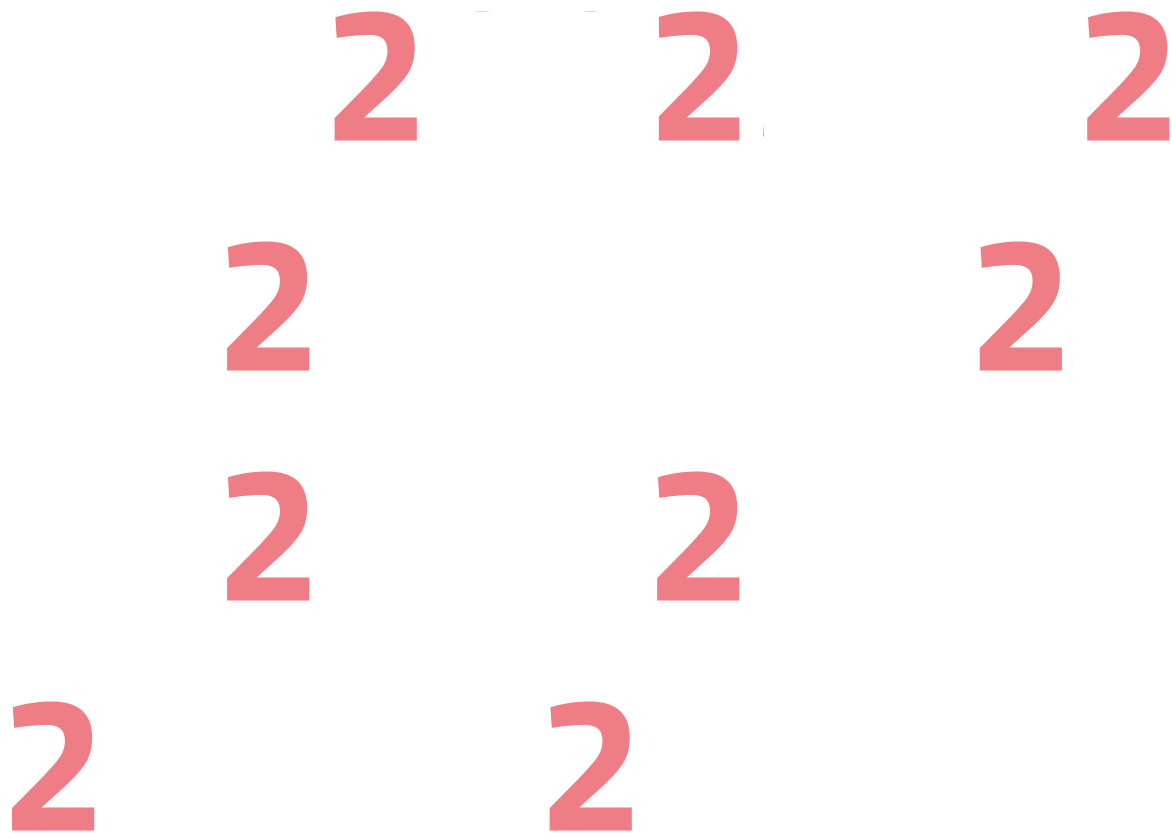
1 5 6 7 2 9 0 2 3 6 5 2 8 3

6 1 0 2 8 4 5 6 7 8 2 8 3 8

4 8 1 2 9 0 0 2 8 1 3 4 5 6

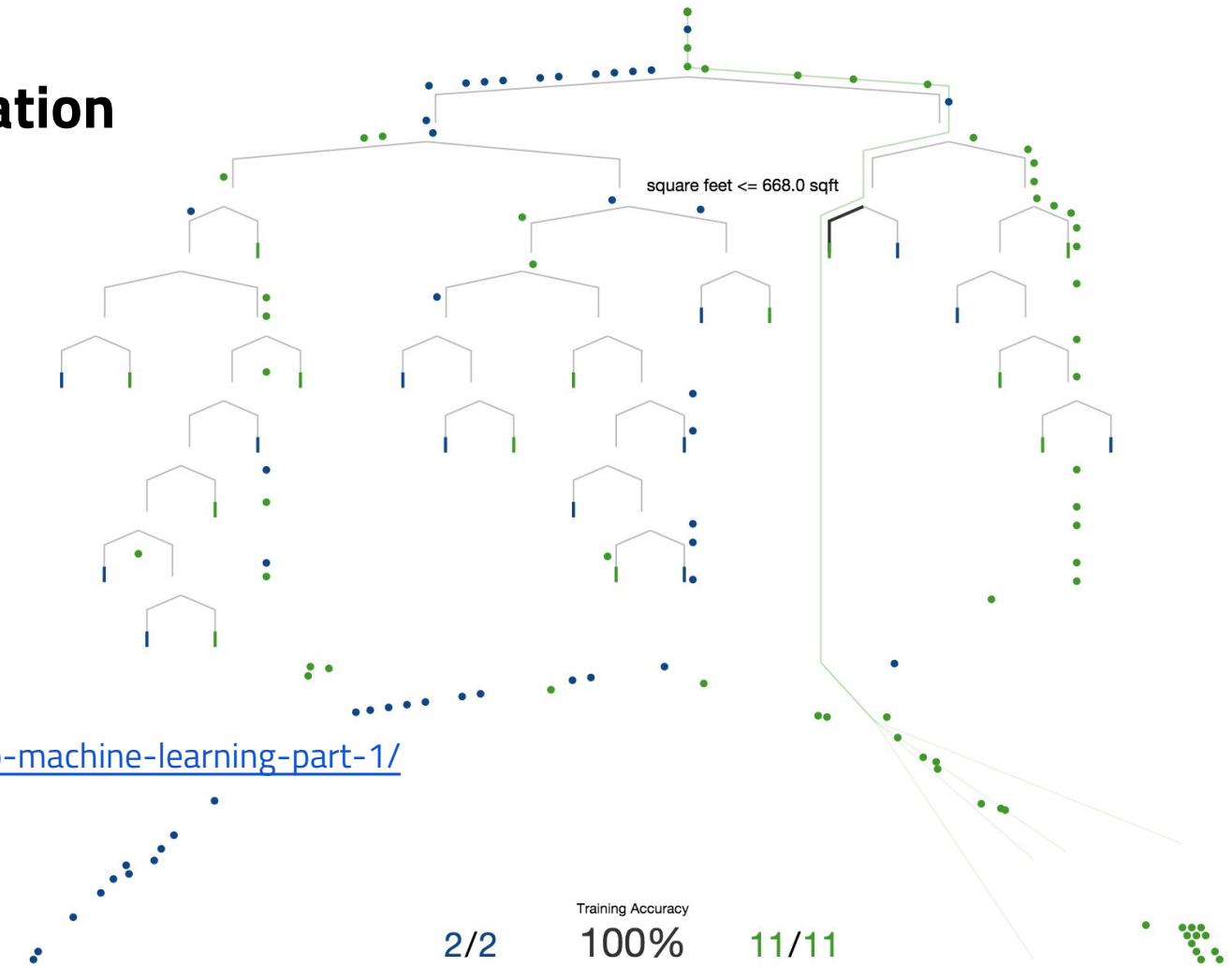
1 2 8 6 4 3 2 7 8 1 4 5 6 0

Enclosure



Sustraction

Filtering Information



LET THE USER
EXPLORE... AND
INTERACT

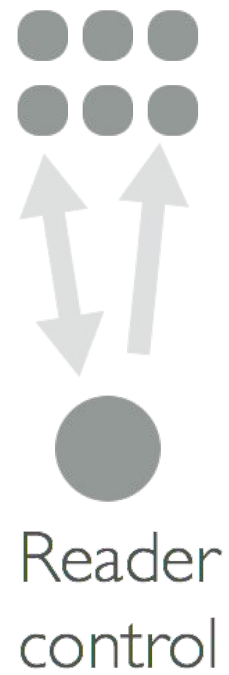
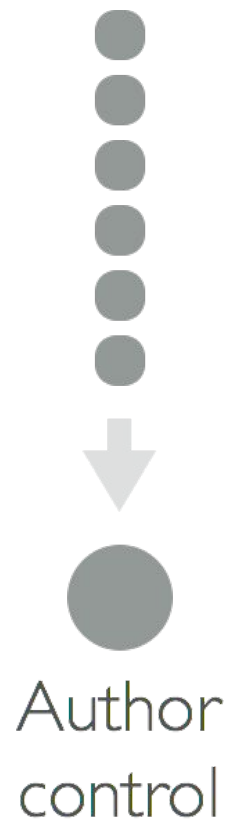
2271 History & Overview
267 Information Mathematics
267 General Topology
945 General Topology
480 Numerical Analysis
548 Loop
627 Statistics
690 Optimization & Control
700 Category Theory
781 K-Theory & Homotopy
876 K-Theory
890 Metric Geometry
1085 Spectral Theory
1394 Symplectic Geometry
1403 Commutative Algebra
1437 Operator Algebras
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4744 Mathematical Physics



TELL A STORY



Mapping the World's Friendships

Learn which countries share the closest friendship connections on Facebook.

Methodology

Show

Language

Search



A Closer Look: Spain & Romania

Romania is the biggest source of immigrants in Spain, although Spain recently decided to close its borders to Romanian immigrants through the end of 2012.

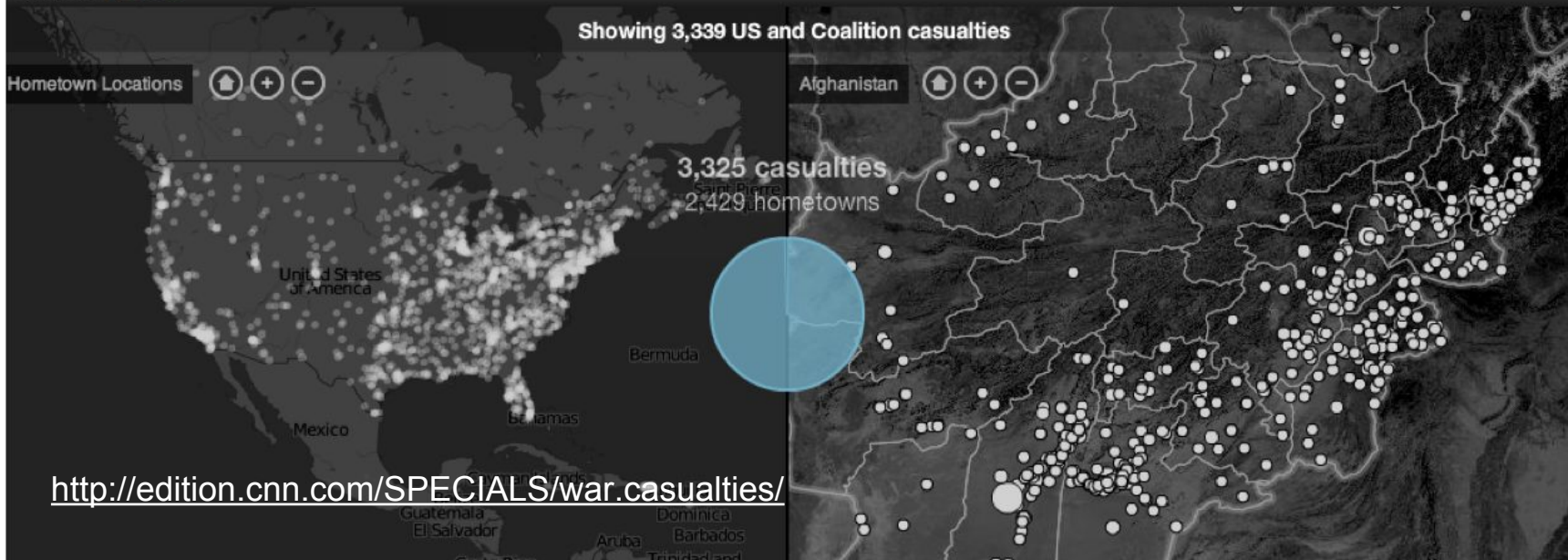
CASUALTIES:

AFGHANISTAN

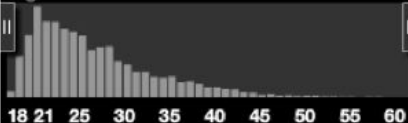
IRAQ

Search

Map view | List view

<http://edition.cnn.com/SPECIALS/war.casualties/>

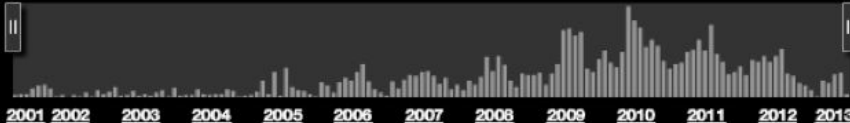
Age



Location: (Countries & U.S. states)



Date



Totals: 3,345 deaths | 18,957 wounded | Last updated 7/17/2013

CASUALTIES:

[AFGHANISTAN](#)
[IRAQ](#)

[Map view](#) | [List view](#)

Showing 3,504 US and Coalition casualties

Hometown Locations



Cpl. Tyler Crooks

24 years old

Hometown: Port Colborne, Canada

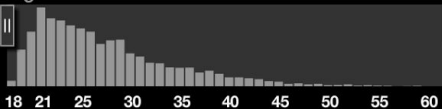
One of two Canadian soldiers killed when a roadside bomb detonated near a dismounted patrol in the Zhari district west of Kandahar, Afghanistan, on March 20, 2009

[Share memories and messages »](#)

Afghanistan

Zhari district

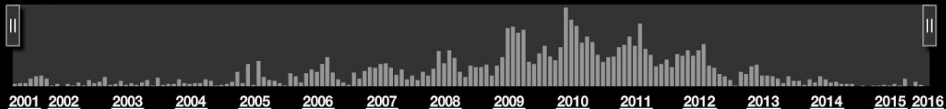
Age



Location: (Countries & U.S. states)



Date



Totals: 3,509 deaths | 20,124 wounded | Last updated 2/17/2016

CASUALTIES:

AFGHANISTAN

IRAQ

[Map view](#) | [List view](#)[« back to Port Colborne, Ontario map](#)

Cpl. Tyler Crooks

[Facebook](#)[Twitter](#)[Share](#)[Email](#)

From: Port Colborne, Ontario
Age: 24
Unit: 3rd Battalion, The Royal Canadian
Regiment Battle Group
Died: March 20, 2009

Fatal incident occurred in Zhari district, Afghanistan

One of two Canadian soldiers killed when a roadside bomb detonated near a dismounted patrol in the Zhari district west of Kandahar, Afghanistan, on March 20, 2009



If you have an update or correction, please contact us.

Memories and messages

Please note: These submissions will also appear on CNN iReport and are subject to the site's [Community Guidelines](#)

[Log in or Sign up](#)

There are no posted memories

[Share memories with iReport](#)

More casualties from Port Colborne, Ontario »



More casualties in Zhari district, Afghanistan »

<https://immersion.media.mit.edu/>



immersion

[log out & save](#) • [log out & delete](#)

Lookup Contacts

Charge

Nodes [A] [S]

Links [Q] [W]

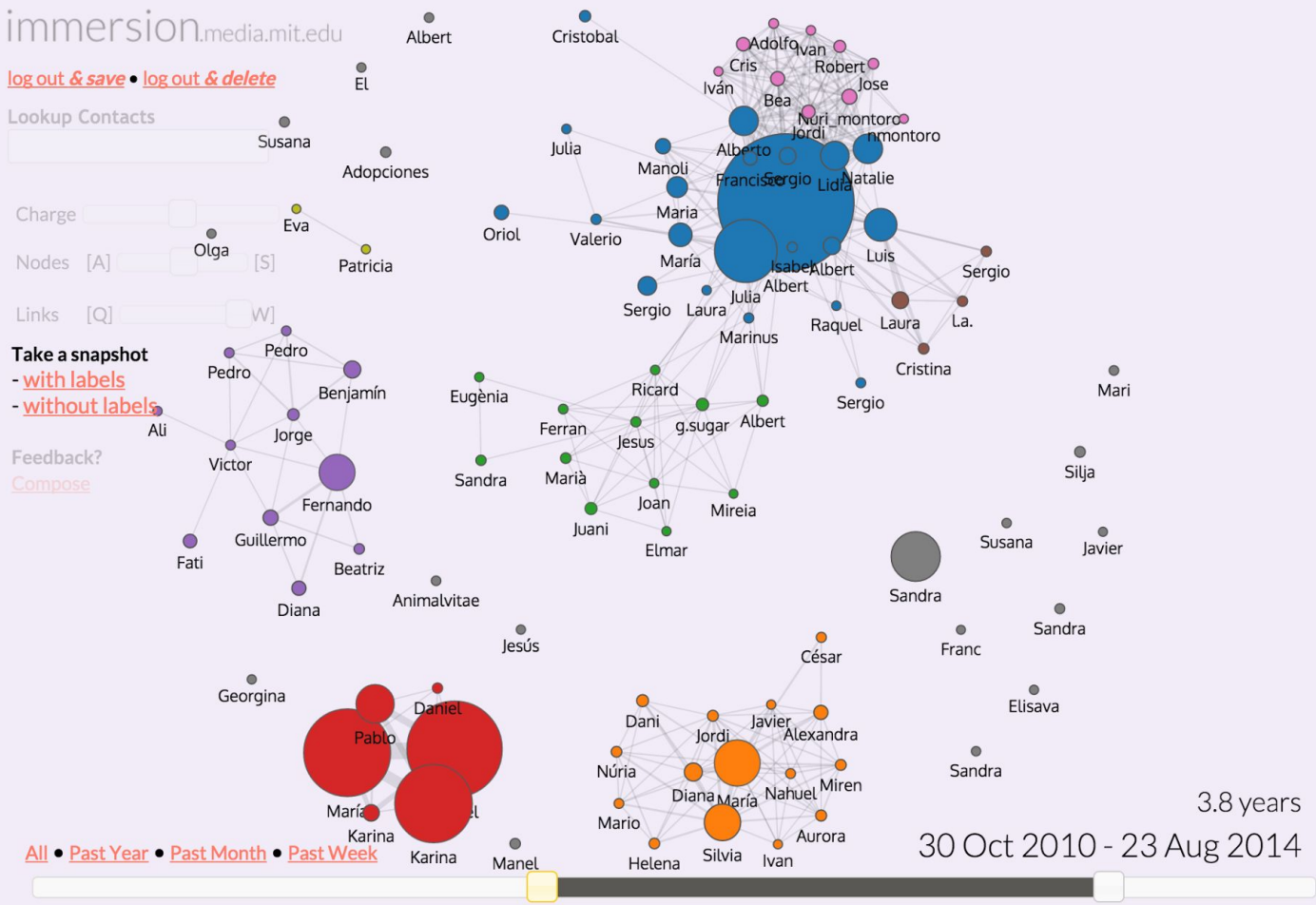
Take a snapshot

- [with labels](#)
- [without labels](#)

Feedback?

[Compose](#)

All • [Past Year](#) • [Past Month](#) • [Past Week](#)



Luz Calvo



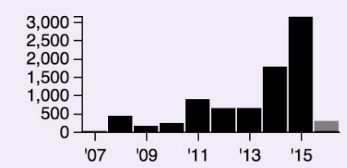
239 collaborators

31,867 emails

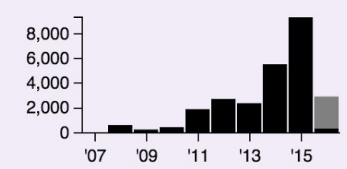
My Stats

[Top Collaborators](#)

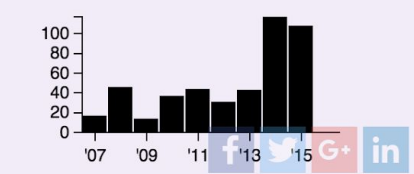
Emails Sent



Emails Received



New Collaborators



3.8 years

30 Oct 2010 - 23 Aug 2014



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Lookup Contacts

Charge

Nodes [A] [S]

Links [Q] [W]

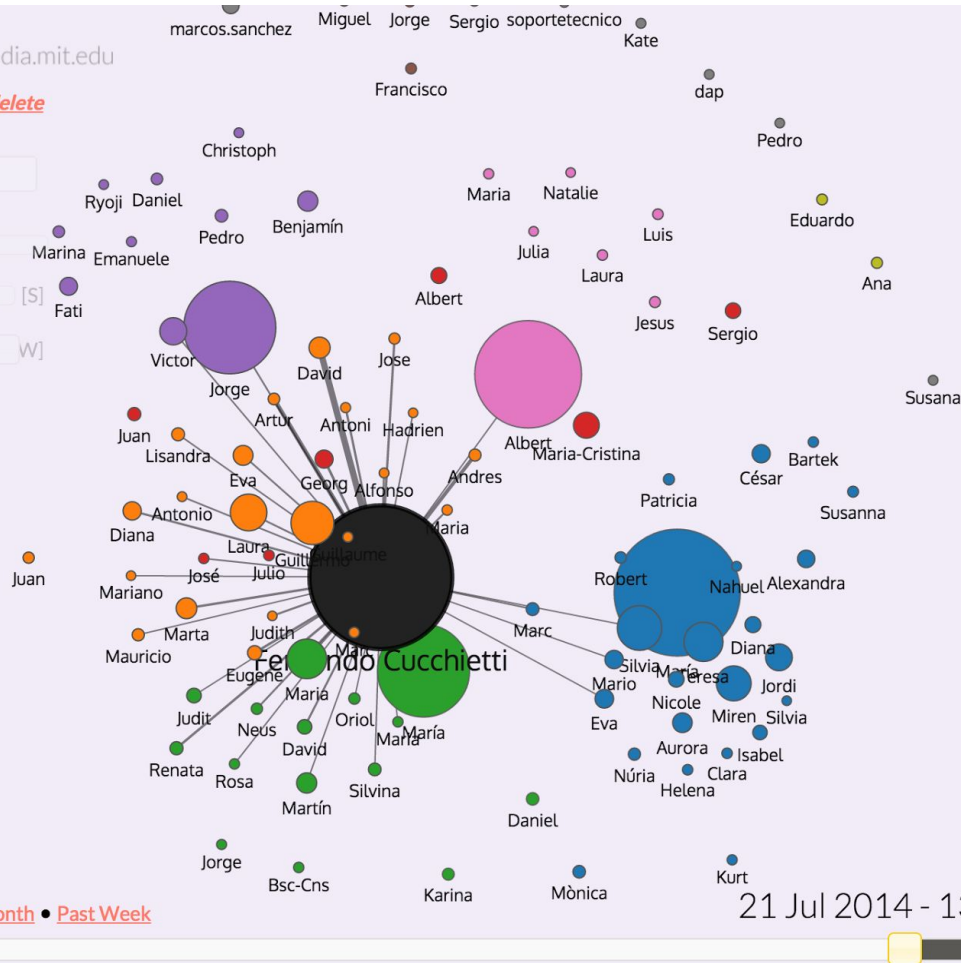
Take a snapshot

- [with labels](#)
- [without labels](#)

Feedback?

[Compose](#)

[All](#) • [Past Year](#) • [Past Month](#) • [Past Week](#)



Luz Calvo

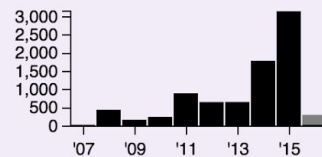


239 collaborators

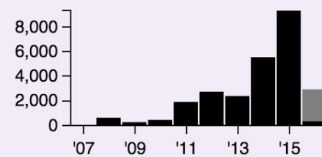
31,867 emails

[My Stats](#) [Top Collaborators](#)

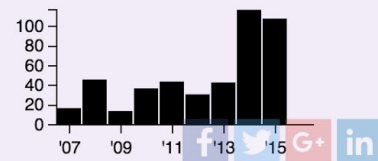
Emails Sent



Emails Received



New Collaborators



IMPROVE YOURSELF

227 History & Overview
267 Information Mathematics
267 General Mathematics
945 General Topology
480 General Analysis
548 Numerical Analysis
627 Logic
690 Statistics & Control
700 Optimization Theory
781 Category & Homology
876 K-Theory & Homology
880 Metric Geometry
1085 Spectral Theory
1384 Symplectic Geometry
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1437 Operator Algebras
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2530 Number Theory
2554 Quantum Algebra
2747 Representation Theory

3449 Differential Geometry

3578 Combinatorics

4704 Algebraic Geometry

4744 Mathematical Physics

Why Visualization?

Effort vs Luck



“unsuccessful”



“successful”

Some references

Edward Tufte

Alberto Cairo

Stephen Few

Moritz Stefaner

Fernanda Viegas

David McCandless

Hans Rosling

Felice Frankel

<http://infomationisbeautiful.net>

<http://flowingdata.com>

<http://datastori.es>

...



Thanks!!

Twitter: @moresimplicis
luz.calvo@bsc.es

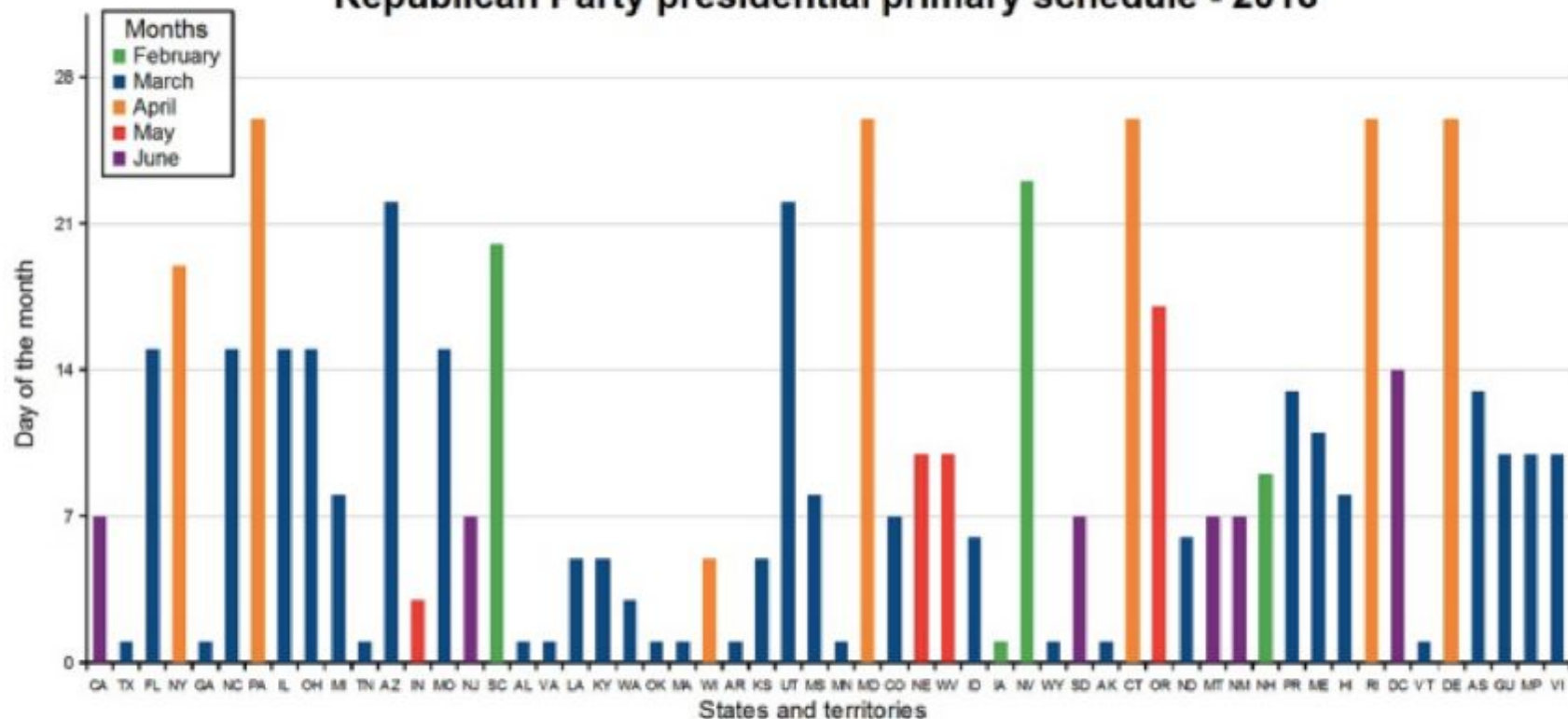
7.

An exercise?

Designing to understanding



Republican Party presidential primary schedule - 2016



Obviously a 50 bar bar chart is the most useful way to show this info.

